ISSN 0253-4924

FOOD TECHNOLOGY *Abstracts*

Vol. 28 No. 6 June 1993

Central Food Technological Research Institute, Mysore
National Information System for Science and Technology
Department of Scientific and Industrial Research, New Delhi.

NATIONAL INFORMATION CENTRE FOR FOOD SCIENCE AND TECHNOLOGY

CFTRI, MYSORE - 570 013

The National Information Centre for Food Science and Technology (NICFOS), is a discipline oriented information service in Food Science, Technology and Nutrition. Set up in October 1977 at the Central Food Technological Research Institute (CFTRI), Mysore, it is one of the Sectoral Information Centres under the NISSAT of the Govt. of India, Dept. of Scientific and Industrial Research.

NICFOS's services are generated by a band of professional specialists and backed up by reprographic, micrographic, printing and computer facility. Its services include publication of R & D and industry oriented current awarness services, answering technical inquries, reprography and training.

NICFOS BASE

The well-equipped Library of CFTRI with its collection going back to 1950 function as a clearing house for information on all aspects of food area. With its large collection of books, monographs, conference proceedings, bound volumes of periodicals, standards, patents, reports, theses, microforms and 600 current periodicals it can provide you with the latest information on any subject area of food. The library also serves as a training centre in different aspects of information handling and use besides guiding in setting up of new libraries in the area of food science and technology.

PHOTOCOPY (XEROX) OF PUBLISHED SCIENTIFIC/TECHNICAL ARTICLES

The National Information Centre for Food Science and Technology (NICFOS) at the Central Food Technological Research Institute, Mysore, has got a good collection of scientific and other periodicals collected over the years in the area of Biological Sciences. If any article is needed for reference work, we will supply one copy from our wealth of collections. The cost of providing the copies is Rs.2/- per page (minimum charge Rs.10.00). Please take advantage of this facility to overcome your problem in getting original articles.

All correspondences regarding these services should be addressed to:

The Head

FOSTIS, CFTRI,

Mysore 570 013,

Karnataka, India.

FOOD TECHNOLOGY ABSTRACTS

Vol. 28 No. 6
June 1993

National Information Centre For Food Science And Technology
Central Food Technological Research Institute,
Mysore - 570 013, India

Compiled and Edited by

B. Vasu

C. S. Anita

Geetha Seetharam

Abstractors to FTA

AA	Author's Abstract
BV	B. Vasu
CSA	C. S. Anita
GS	Geetha Seetharam
KAR	K. A. Ranganath
SD	S. Dhanaraj
SRA	S. R. Ananthnarayan
VKR	V. Krishnaswamy Rao

Computerisation and Database Creation

P. Manilal

C. S. Anita

B. Vasu

S. R. Ananthnarayan

Annual Subscription : Rs.250.00. US $ 85.00. Single Copy : Rs.25.00

FOOD TECHNOLOGY ABSTRACTS

Vol. 28, No. 6, 1993

CONTENTS

	Page No
General	325
Food Processing	326
Food Packaging	326
Food Engineering and Equipment	327
Energy in Food Processing	-
Food Chemistry and Analysis	327
Food Microbiology and Hygiene	328
Biotechnology	-
Tissue Culture	-
Food Additives	330
Cereals	330
Millets	-
Pulses	331
Oilseeds and Nuts	331
Tubers and Vegetables	334
Fruits	337
Confectionery, Starch and Sugar	340
Bakery products	341
Milk and Dairy products	342
Meat and Poultry	346
Seafoods	351
Protein Foods	354
Alcoholic and Non-alcoholic Beverages	354
Fats and oils	358
Spices and Condiments	359
Sensory Evaluation	359
Food Storage	-
Infestation Control and Pesticides	360
Biochemistry and Nutrition	360
Toxicology	363
Food Laws and Regulations	-
Author Index	365
Subject Index	371

ABBREVIATIONS

A	ampere
AAS	atomic absorption spectrometry
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
°C	degree centigrade
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetraaceti acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gr	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short tim
Hz	hertz [frequency cycles/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcalk, kg]
K	Kelvin
l	litre
lb	pound
lbf	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
M	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt.	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, etc
N	Normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	Poise
p	probability
Pa	pascal (N/M^2)
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	South, Southern, etc.
s.d.	standard deviation
SDS	sodium dodecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
W	watt
W.	West,Western,etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
μ	micro–[as in g, μm]
%	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

ABBREVIATIONS FOR LANGUAGES

Language of text	
Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
Spanish	Es
Swedish	Sv

1197

Sarkar (B). **Role of states in the growth of food processing industries.** *Indian Food Packer* 46(5); 1992; 80-82

The role of West Bengal government in the growth of food processing industries is analysed. Efficient management, innovation, adequate R&D input, quality consciousness and linkage with indigenous and foreign market are suggested to create a better future for food processing industries. The setting up of the Ministry for Food Processing Industries, the introduction of self employment scheme for the registered unemployed; inviting entrepreneurs to take up food processing units are some of the other steps taken already in this direction. GS

1198

Joshi (SV). **Role of states in the growth of food processing industries.** *Indian Food Packer* 46(5); 1992; 83-85

Reports (i) the reasons for poor food production and processing, (ii) the factors that determine the success of the small scale processors, (iii) the role of Maharashtra State in the gorwth of food processing industries, and (iv) the work done by Nagpur Orange Growers' Association and Maharashtra Fruit Corporation. GS

1199

Jakhu (R). **Role of states in the growth of food processing industries.** *Indian Food Packer* 46(5); 1992; 86-89

Highlights steps taken by Haryana Government in creating essential infrastructure for the growth of fruit and vegetable processing industries; the role of Haryana Agro Industries Corp. Ltd., as a nodel agency for promotion of agro-based industries; the new industrial policy for promotion of such industries; the role of Haryana Warehousing Corp. for cold storage; schemes for getting refrigerated vans for fruit transportation; government subsidies and octroi exemptions; single window services to simplify procedures; power projects; and development and marketing efforts by Haryana State Agricultural Marketing Board. GS

1200

Natesan (kP). **Role of states in the growth of food processing industries.** *Indian Food Packer* 46(5); 1992; 90-92

Highlights the present scenario of Indian food processing industry with an annual growth of 6% in food products; lack of consistency in performance; limited presence in world markets and fewer consistent buyers in the export scene. Suggests the need for paying more attention to sorting, grading, storage, processing, transportation and marketing; giving credit support to the enterpreneurs; developing special purpose industrial estates to provide subsidised infrastructure; conducting training programmes for the enterpreneurs; operting a databank to disseminate information of vital interest; formation of an agency in each state equipped with a technical cell, financial cell, information cell and a training cell, which should work under the Ministry of Food Processing Industry, Government of India; development of cold storage facilities for potato, apple and few other vegetables and fruits; and preservation of freshness of vegetables and fruits by refrigerated or insulated transportation. GS

1201

Lsalsangzuala (J). **Role of states in the growth of food processing industries.** *Indian Food Packer* 46(5); 1992; 103-105

Lack of infrastructural facilities, high cost of transportation and insufficient power supply are some of the problems faced by Mizoram. However, the government has launched several schemes and projects on pineapple, maize, ginger, chillies, turmeric, tapioca and passion fruit. The Mizoram Food and Allied Industries Corporation Ltd., looks after the Department of Food and Vegetable Processing Industries (including freezing and dehydration); food grain milling industries; processing and refrigeration of poultry and meat products; and financing of food and allied industries. GS

1202

Molla (AR). **Role of states in the growth of food processing industries.** *Indian Food Packer* 46(5); 1992; 106-107

Highlights the role of West Bengal State in the growth of food processing industries such as setting up of an independent department for food processing industries for the first time in India; lead taken by the State in the sector of small scale industries; and preparation of information, data, process technologies and projects. Suggests establishment of information cell in Calcutta for the eastern and north-eastern states to expediate the assistance given by the Ministry of Food Processing Industries under the plan; and promote development schemes for tiny/cottage industries in West Bengal. GS

1203

Stevenson (MH). **Progress in the identification of irradiated foods.** *Trends in Food Science and Technology* 3(10); 1992; 257-262

The development of methods for identifying irradiated food enhances consumer confidence in irradiation; help the governments to enforce labelling regulations; and assist in the promotion of international trade in irradiated foods. The methods thermoluminescence, electron spin resonance (ESR) spectroscopy and formation of long-chain hydrocarbons and 2-alkylcyclobutanones from lipids in foods, which are currently being developed are discussed in the review. 35 references. BV

FOOD PROCESSING

1204

Rahman (MS). **Osmotic dehydration kinetics of foods.** *Indian Food Industry* 11(5); 1992; 20-24

The study deals with information on osmotic dehydration kinetics of foods which can be used in food industry for design and control purposes; its application in food industry (quality improvement, energy efficiency, reduction in packaging and distribution costs, avoiding chemical treatment, product stability during storage). Factors affecting osmotic dehydration such as type of osmotic agent, concn. of osmotic sol., temp. of osmotic sol., properties of solute used in osmosis, agitation of osmotic sol., geometry of the material, osmotic sol. and food mass ratio, physical and chemical properties of food materials, and the process design and control of osmotic dehydration kinetics are also considered in the study. CSA

1205

Azuara (E), Cortes (R), Garcia (HS) and Beristain (CI). **Kinetic model for osmotic dehydration and its relationship with Fick's second law.** *International Journal of Food Science and Technology* 27(4); 1992; 409-418

A two-parameter equation was developed from mass balance considerations and used to predict the kinetics of osmotic dehydration and the final equilibrium point. The model was tested using kinetic data from ten differnt experiments and was able to predict water loss and solids gained over long periods of drying. The final equilibrium point was estimated using data obtained during a relatively short period of time. Simple equations were obtained when the model was related to Fick's second law for non-steady one-dimensional diffusion through a thin slab, and apparent diffusion coeff. were readily estimated from these equations. AA

FOOD PACKAGING

1206

Narayanan (PV). **Newer concepts in packaging - relevance to food packaging in India.** *Indian Food Industry* 11(5); 1992; 34-36

Packaging materials

1207

Olafsson (G), Jagerstad (M), Oste (R) and Wesslen (B). **Delamination of polyethylene and aluminium foil layers of laminated packaging material by acetic acid.** *Journal of Food Science* 58(1); 1993; 215-219

LDPE

1208

Nielsen (TJ), Jagerstad (IM) and Oste (RE). **Study of factors affecting the absorption of aroma compound into low-density polyethylene.** *Journal of the Science of Food and Agriculture* 60(3); 1992; 377-381

A supercritical fluid extraction/gas chromatography method has been used to study the influence of different factors on the absorption of aroma compounds into LDPE. Factors studied included concn. of aroma substances, storage temp., pH and interactive effects of different food components. There were no significant differences in the partition coeff. when the concn. of the flavours was varied between 0.1 and 10 mg kg^{-1}. The storage temp., however, affected the absorption significantly ($P < 0.05$), approx. twice as much was absorbed at 75°C compared with 5°C. Acidification to pH 3 with acetic acid did not significantly alter the amounts of the aromas being absorbed. Further, when occurring alone in the model solutions the aroma substances had much larger partition coeff. than when in mixtures with others, indicating an antagonistic effect of different aroma compounds on absorption. Olive oil and, thereby, the flavours dissolved in the oil, were absorbed in large amounts by the plastic. Extractions of plastic films stored in conc. apple juice were successfully carried out. In addition to many unknown substances, 9 of the 10 aromas used in the model solution were detected in the plastic stored in conc. apple juice. AA

Plastics

1209

Rangarao (GCP). **Retortable plastic packaging for thermo-processed foods.** *Indian Food Industry* 11(6); 1992; 25-32, 36

The characteristics of retortable plastic packages consisting of heat-resistant plastic layers with or without Al foil and their ability to be thermo-processed to result in shelf-stable food products with less energy and material costs and the added convenience of reheating like the boil-in-bag product are discussed. Aspects covered are the materials used for making retort pouches, pouch design and fabrication, production considerations, production systems, retort pouch products, quality and shelf-life and semi-rigid containers. CSA

FOOD ENGINEERING AND EQUIPMENT

1210

Sun (X), Litchfield (JB) and Schmidt (SJ). **Temperature mapping in a model food gel using magnetic resonance imaging.** *Journal of Food Science* 58(1); 1993; 168-172, 181

Two dimensional temp. maps of a model food gel (agar, microcrystalline cellulose, and water, 1.95:6.55:200), were obtained by MRI during heating and cooling. The molecular pseudo self-diffusion coeff. could be used as a temp. indicator. The temp. coeff. using the D^* method was 13%/°C. The error in the MRI measurement was 1°C with 1.5 mm^2 spacial resolution. The results by MRI were in good agreement with measurements by thermocouples. The max. difference between them was 1.26°C. MRI is a promising new technique to study heat transfer and to measure thermal properties of foods. SRA

Equipments

1211

Abichandani (H), Dodeja (AK) and Sarma (SC). **A multiple merit heat exchanger for dairy and food industries.** *Indian Food Industry* 11(6); 1992; 22-24

The multiple merits and versatility of thin film scraped surface heat exchanger and its potential application in food industries for lumpy products, viscous products, sticky products and crystallizing products as well as its specific applications in dairy industries for continuous ghee making, continuous khoa making, lactose manufacture and UHT processing of milk is described in this article. CSA

1212

Tong (CH), Sheen (S), Shah (KK), Huang (VT) and Lund (DB). **Reference materials for calibrating probes used for measuring thermal conductivity of frozen foods.** *Journal of Food Science* 58(1); 1993; 186-189, 192

Reference materials which contained either 8% or 10% bentonite pastes and very fine pure copper powder (300 mesh, 30-55%), provided thermal conductivities ranging from 0.9 to 1.9 W/mK. These materials were used to calibrate probes for measuring thermal conductivity of frozen food materials. Thermal conductivity values measured by the steady-state (parallel plate) method, the unsteady-state heat transfer (heating curve) method, and the probe method agreed within 5%. Although experimental density and heat capacity data of copper-filled bentonite pastes agreed with a mass average value of component properties, measured thermal conductivity values were much lower than the volume fraction average values. AA

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

1213

Izzo (HV) and Ho (C-T). **Peptide-specific Maillard reaction products: a new pathway for flavour chemistry.** *Trends in Food Science and Technology* 3(10); 1992; 253-257

Amino acids (AA) bound in proteins and peptides play a significant role in the generation of flavours in foods during heating. Aspects discussed in this review include: the role of 'free' and 'bound' AA in aroma compounds development, peptide-specific aroma generation (Pyrazinone formation), and inhibition of pyrazinone formation (structural constraints dictte the volatiles formed). 20 references. BV

1214

Bell (LN) and Labuza (TP). **pH of low-moisture solids.** *Trends in Food Science and Technology* 3(10); 1992; 271-274

Reviews the role of pH on food stability and processing; the traditional approach to

measurement of pH in low-moisture solids; the use of surface glass electrodes without the addition of water to get a better indication of pH of low-moisture systems; and a comparison of pH values of dehydrated solid systems derived by various methods, inhibition of microbial growth by a combination of reduced pH and a_w. 25 references. GS

Chemistry (Analytical)

1215

Iyengar (V). **Preparation of food and agricultural reference materials for analytical quality assurance.** *Indian Food Industry* 11(6); 1992; 20-21

The implications of various factors (justification for a particular reference material (RM) matrix, anticipation of the analytical intricacies, formulation of a work plan, procurement of chemicals and supplies, preparation and packaging of the RM, tests for homogeneity and chemical characterization and certification) as they relate to preparation and certification of food and agricultural RMs are addressed in this communication. The primary focus is on the inorganic constituents in food related analytical quality assurance materials. CSA

FOOD MICROBIOLOGY AND HYGIENE

Microorganisms

1216

Arihara (K), Kushida (H), Kondo (Y), Itoh (M), Luchansky (JB), Cassens (RG). **Conversion of metmyoglobin to bright red myoglobin derivatives by *Chromobacterium violaceum*, *Kurthia* sp., and *Lactobacillus fermentum* JCM1173.** *Journal of Food Science* 58(1); 1993; 38-42

Lactic acid bacteria (LAB) and various bacteria isolated from the environment were screened on microbiological media for the ability to convert brown metmyoglobin to more desirable bright red derivatives. Of 1,550 environmental isolates tested, two isolates (*Kurthia* sp. K-22 and *Chromobacterium violaceum* K-28) were recovered which consistently converted metmyoglobin to more desirable colour derivatives as characterized spectrophotometrically. Strains K-22 and K-28 produced oxymyoglobin and nitric oxide myoglobin, respectively. Of 347 LAB tested, one strain (*actobacillus fermentum*JCM1173) was identified that generated nitric oxide myoglobin. These data indicate certain bacteria can effectively convert metmyoglobin to more red forms, and establsh the potential of bacterial systems for preserving or improving the colour of meat products. AA

1217

Sapru (V), Smerage (GH), Teixeira (AA) and Lindsay (JA). **Comparison of predictive models for bacterial spore population resources to sterilization temperatures.** *Journal of Food Science* 58(1); 1993; 223-228

Comparisons of characteristics of recent models and the conventional model of bacterial spore populations during thermal sterilization showed the conventional model was inadequate for general representation because it lacks activation of dormant spores. New models accounting for activation differed in other assumptions but obviated heat shock of indicator spores required when using the conventional model in validations of thermal sterilization. Comparisons of rate constants and simulated and experimental responses of models of *B. stearothermophilus* spores in constant and dynamic temp. showed one new model was more general, more accurate and preferred. Arrhenius equations accurately described temp. dependencies of all rate constants of that model. AA

Bacteria

1218

Buchanan (RL) and Klawitter (LA). **Characterization of a lactic acid bacterium, *Carnobacterium piscicola* LK5, with activity against *Listeria monocytogenes* at refrigeration temperatures.** *Journal of Food Safety* 12(3); 1992; 199-217

A lactic acid bacterium (LK5) originally isolated from raw ground beef was characterized in relation to its abili tyto inhibit the growth of *L. monocytogenes*. The isolate, which was identified as *Carnobacterium piscicola*, inhibited the growth of 17 of 21 strains of *Listeria* (*L. monocytogenes*, *L. innocua*, *L. ivnovii*, *L. welshimeri*, and *L. grayii*). Its activity was not due to either acid or hydrogen peroxide production, but was related to the production of a heat stable bacteriocin. The isolate was most active against *L. monocytogenes* at refrigeration temp. due to the combined effect of the pathogen's increased susceptibility, LK5's rapid growth rate, and enhanced bacteriocin production at low temp. Examination of the effect of inoculum ratios in co-cultures of *C. piscicola* LK5 and *L. monocytogenes* Scott A indicated that the lactic acid bacterium was active against *L. monocytogenes* even when the initial level of the pathogen was 100-fold greater. Evaluation of the impact of oxygen available ty,

initial pH, and sodium chloride content on the effectiveness of LK5 suggested that the isolate could be used to suppress the growth of *Listeria* in a variety of refrigerated foods. AA

1219

Buchanan (RL) and Klawitter (LA). **Effectiveness of *Carnobacmerium piscicola* LK5 for controlling the growth of *Listeria monocytogenes* Scott A in refrigerated foods.** *Journal of Food Safety* 12(3); 1992; 219-236

Eight foods, including UHT pasteurized milk, raw ground beef (sterile and nonsterile), canned dog food, pasteurized crabmeat, chicken roll, frankfurters and canned creamed corn were inoculated with 10 cfu/g *L. monocytogenes* Scott A, with and without 10 cfu/g LK5, and incubated at 5 and 19°C. Samples were removed periodically and assayed for total aerobic plate count using Brain Heart Infusion Agar and *L. monocytogenes* using Vogel-Johnson Agar or Modified Vogel Johnson Agar. The growth of *L. monocytogenes* was suppressed in milk, dog food, crabmeat, creamed corn, and frankfurters stored at 5°C. The microorganism was less inhibitory at 19°C. In sterile raw ground beef, LK5 inactivated the pathogen at 5°C and prevented its growth at 19°C. No activity attributable to LK5 was observed in refrigerated nonsterile ground beef or chicken roll; however, these products did not support the psychrotrophic growth of the pathogen even in the absence of LK5. LK5 was most effective in product where the background micro flora was reduced by either thermal processing or irradiation treatment. The results show that *C. piscicola* LK5 can be used to control the growth of susceptible, strains of *L. monocytogenes* in a variety of foods particularly at refrigeration temp. CSA

Clostridium perfringens

1220

McClane (BA). ***Clostridium perfringens* enterotoxins: Structure, action and detection.** *Journal of Food Safety* 12(3); 1992; 237-252

C. perfringens Type A is one of the most common causes of food-borne disease in the USA. Diarrheal and cramping symptoms associated with this illness are caused by a protein enterotoxin (CPE). Recently, diagnosis of *C. perfringens* food poisoning has been improved by the development of direct assays to detect CPE in feces or CPE production by food or fecal isolates of *C. perfringens*. The enterotoxin has a membrane-active action which appears to involve four early steps: (1) binding of CPE to a mammalian receptor, (2) insertion of CPE into membranes, (3) formation of a complex between CPE and mammalian membrane proteins and (4) onset of toxin-induced ion and water permeability changes. CPE has a unique amino acid sequence, and recent studies have indicated that the receptor-binding region of enterotoxin is localized at the extreme C-terminus. Further studies of the CPE structure versus function relationship may facilitate development of vaccines for human or veterinary usage. AA

Fungi

Mushrooms

1221

Zakia Bano, Rajarathnam (S) and Shashirekha (MN). **Mushrooms - unconventional single cell protein for a conventional consumption.** *Indian Food Packer* 46(5); 1992; 20-31

Outlines the growth and life cycle of mushrooms, their morphology and development; edibility; chemistry, nutritional and biomedicinal properties; preservation and processing techniques like refrigeration, deep freezing, pickle making, dehydration, canning and fermentation, and their role as an unconventional single cell protein for human consumption. GS

1222

Briones (GL), Varoguaux (P), Chambroy (Y), Bouquant (J), Bureau (G), Pascat (B). **Storage of common mushroom under controlled atmospheres.** *International Journal of Food Science and Technology* 27(5); 1992; 493-505

The effect of controlled atm. (CA) on the shelf-life of the common mushroom (*Agaricus bisporus*) was assessed using 6 parameters correlated with its commercial qualities. Low CO_2 concn. (up to 2.5%) reduced brown discolouration compared to the control in air. Higher CO^2 concn. enhanced both internal and external browning. Low O_2 concn. reduced growth of micro-organisms, including pseudomonads. Respiration rate, when the mushrooms are placed again in normal air, is proportional to CO_2 concn. during storage suggesting that CO_2 exhibits a phytotoxic effect on mushrooms. A lower mannitol content was noted in mushrooms stored under CA than those stored in air (control). Mushrooms stored in a 5% CO_2 atm. for 7 days did not break their veil but their texture was very soft and spongy. Texture losses decreased when CO_2 concn. increased. AA

FOOD ADDITIVES

Preservatives

Nisin

1223

Kalra (MS), Matta (H) and Singh (A). **Nisin as an aid in extending shelf life of various foods.** *Indian Food Packer* 46(4); 1992; 5-15

Reviews the properties of nisin, mode of action, potential applications of nisinpotential applications of nisin as a preservative in various foods like hard processed cheeses, pasteurised and sterilized milks, milk products (yoghurt, cream, khoa, kheer, milk pudding), canned foods (processed cheese, vegetable and soups), fruits, semi preserved meat, alcoholic beverages and toxicity. 73 references. BV

CEREALS

Rice

1224

Itoh (K) and Kawamura (S). **Milling characteristics of parboiled rice and properties of milled rice. Studies on parboiled rice. Part II.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(9); 1991; 776-783 (Ja)

The milling characteristics and the properties of milled rice of parboiled brown rice were investigated. The electric power consumption of parboiled brown rice using the abrasive type and friction type mill was higher than that of untreated brown rice. The electric power consumption by abrasive type mill increased with the increase of degree of gelatinization. When the degree of gelatinization was above 30%, the electric power consumption increased steeply. The electric power consumption by friction type mill decreased with the increase of the degree of gelatinization. However, the minimum value of parboiled rice was one and a half times as much as untreated brown rice. The temp. of milled prboiled rice was about 5°C higher compared with untreated materials. The broken kernel rate was higher when the degree of gelatinization was in range of 2 - 40%, while decreased when the degree was more than 50%. As the degree of gelatinization increased, the bulk density and whiteness decreased. The light transmittance, water absorption and colour difference were increased due to increasing the degree of gelatinization. AA

1225

Yasui (T). **Detection of waxy maize starch adulteration in waxy rice cake by use of stable carbon isotope ratio analysis.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(9); 1991; 864-870

Waxy rice cake, a popular New Year food in Japan, is occasionally adulterated with waxy maize starch. The stable carbon isotope ratios ($^{13}C/^{12}C$) of 132 samples of 71 waxy rice cvs grown in Japan and 54 samples of maize starch have been determined by isotope ratio MS. The $^{13}C/^{12}C$ values of fully milled waxy rice and maize starch ranged from -24.4 to -27.3 parts per thousand (per mil) and from -9.6 to -11.1 per mil, respectively. Rice cakes with $\delta^{13}C$ values higher than -24.2 per mil, 3 standard deviations from the mean of fully-milled rice, should be considered adulterated. AA

Wheat

1226

Arun Kumar (GC). **Wheat conditioning.** *Indian Miller* 23(3); 1992; 9-11

Various types of wheat conditioning viz. cold conditioning, warm conditioning, hot conditioning in order to toughen the bran and mellowing the endosperm and factors influencing conditioning are highlighted. SRA

1227

Gontard (N), Guilbert (S) and Cuq (J-L). **Water and glycerol as plasticizers affect mechanical and water vapor barrier properties of an edible wheat gluten film.** *Journal of Food Science* 58(1); 1993; 206-211

1228

Jood (S) and Kapoor (A-C). **Biological evaluation of protein quality of wheat as affected by insect infestation.** *Food Chemistry* 45(3); 1992; 169-174

Rat growth and nitrogen balance studies were carried with infested wheat caused by mixed population of *Trogoderma granarium* Everts and *Rhizopertha dominica* Fabricius. The result indicated marked decrease in food intake, body wt. gain, food efficiency ratio, PER, nitrogen absorption, biological value, NPV and dry matter digestibility with 50% and 70% infested grain. Grain infestation of 25% level showed only marginal differences. All the above parameters were negatively related to infestation levels. SD

Wheat flour

1229

Yeh (A-I) and Hwang (S-J). **Effect of screw profile on extrusion-cooking of wheat flour by a twin-screw extruder.** *International Journal of Food Science and Technology* 27(5); 1992; 557-563

The effects of forward-, reverse-, and no-flight screw elements on the residence time distribution, dispersion number, and product properties were investigated in extrusion cooking of wheat flours in a twin-screw extruder. Mean residence times of 46.5s with a forward element increased to 59.6s with a reverse flight and 67.6s with a no-flight element. Dispersion numbers were 0.051, 0.056, and 0.075 respectively. The no-flight element reduced cooking loss and increased the degree of gelatinization of products. AA

PULSES

1230

Singh (U) and Singh (B). **Tropical grain legumes as important human foods.** *Economic Botany* 46(3); 1992; 310-321

The production, consumption, processing (dehulling and cooking), food uses, chemical composition and the effect of processing (soaking and germination, fermentation, cooking) on the nutritive value of grain legumes such as chickpea (*Cicer arietinum*), pigeon pea (*Cajanus cajan*), mung bean (*Vigna radiata*), Black gram (*Vigna mungo*), curd bean, cowpea (*Vigna unguiculata*), lentil (*Lens esculenta*), soybean (*Glycine max.*), and peanut (*Arachis hypogaeae*) are summarised. Grain legumes as sources of protein, vitamins and minerals; their utilization and diversified food uses are also highlighted. GS

Bambara groundnut

1231

Brough (SH) and Azam-Ali (SN). **The effect of soil moisture on the proximate composition of bambara groundnut (*Vigna substerranea* (L) Verdc.).** *Journal of the Science of Food and Agriculture* 60(2); 1992; 197-203

Bambara groundnut seeds, produced under five levels of irrigation (0-300 mm range) in a suite of controlled-environment glasshouses, were analysed for their proximate composition. There was no significant effect of water treatment on the seed composition. Mean values (g kg-1 DM) of dry matter, protein, starch, free sugars, non-starch polysaccharides and lipids were 8.91, 2.53, 4.28, 0.15, 2.56 and 0.79 respectively. Bambara groundnut protein was deficient in the sulphur amino acids, methionine and cysteine but met the FAO requirements for all other essential and non-essential amino acids. Of the non-starch polysaccharides (NSP) of bambara groundnut, the ratio of insoluble to soluble fractions was 57:43. Cellulose accounted for 36% of the total NSP. Approximately 12.8% of the total NSP was resistant to acid and enzymic hydrolysis. This fraction was attributed to lignified seed coat material and low molecular weight phenolic compounds. Tannin complexes capable of precipitating 142.6 g BSA (bovineserum albumin) per kg seed and trypsin inhibitor activity (13 g kg-1 DM) were measured in all five bambara groundnut treatments. The presence of these anti-nutrients may have implications for the bio-availability of bambara groundnut protein. AA

Green beans

1232

Baron (RF) and Penfield (MP). **Panelist texture preferences affect sensory evaluation of green bean cultivars (*Phaseolus vulgaris* L.).** *Journal of Food Science* 58(1); 1993; 138-139, 143

The effects of textural preferences on sensory intensity and hedonic scores assigned by consumer panelists (50 preferred "soft" and 38 "crisp" beans) to green beans of two cvs cooked by 2 methods were studied. Boiled and 'Strike' beans were rated lighter than steamed and 'Mustang' beans. 'Mustang' beans were scored more acceptable for colour, flavour and overall likability. Soft textural preference panelists liked steamed beans less than boiled beans for texture, flavour, and overall likability. Hedonic scores assigned by panelists of crisp textural preference did not differ by preparation method. Selecting panelists without considering textural preferences may influence hedonic but not intensity scores. AA

OILSEEDS AND NUTS

1233

Naczk (M), Myhara (RM) and Shahidi (F). **Effects of processing on the oligosaccharides of oilseed and legume protein meals.** *Food Chemistry* 45(3); 1992; 193-197

The effects of (alkanol)-hexane, (alkanol/water)-hexane and (alkanol/ammonia/water)-hexane extraction systems on the removal of low-mol. wt. sugars from soybean, cottonseed, field pea and mung bean were

studied. The results indicated that ROH/ammonia processing greatly reduced the content of low-mol. wt. sugars of oilseeds and legumes. The reducing flatulence activity may improve the nutritional quality of the resultant meals. SD

Nutmegs

1234

Takahashi (T). **Aflatoxin contamination in nutmeg: Analysis of interfering.** *Journal of Food Science* 58(1); 1993; 197-198

A mixture of ground nutmeg and ground cinnamon leaves was subjected to TLC; spots appeared on the TLC plate hampered the detection of aflatoxins. These spots represented oxidation or heat-induced degeneration of the cinnamon leaves. In this study, aflatoxins were detected in 29 (43%) of 67 samples. Aflatoxin B1 was detected in 29 samples, B2 in 8 samples and aflatoxin G1 in 1 sample. Aflatoxin G2 was not detected in any samples. The mean aflatoxin B1 concn. was 0.68 μg/kg. BV

Sesame

1235

Rajendran (S) and Prakash (V). **Structural stability of β-globulin, the low molecular weight protein fraction from sesame seed (*Sesamum indicum* L.) in alkaline solution.** *Indian Journal of Biochemistry and Biophysics* 30(1); 1993; 15-20

β-globulin, a single polypeptide chain of mol. wt. 15,000 plus or minus 1,000, undergoes denaturation in alkaline pH (7.0-13.0), thereby affecting the hydrodynamic properties of the protein, viza., a decrease in sedimentation coeff. from a value of 2.0s to 1.4s at pH 11.3, an increase in reduced viscosity from 0.042 dl/g to 0.158 dl/g at pH 12.6 and a decrease in partial specific vol. resulting in a vol. change of 6.3+1.0 ml/mole residue at pH 11.7. The parturbation of tryptophanyl residues and ionization of tyrosyl residues are preceded by alteration in conformational status of the protein. The fluorescence emission measurements indicate initial unfolding of the protein molecule which exposes the tryptophan and tyrosyl residues to the solvent. The tyrosyl phenolic group ionization is anomalous having a pK int value of 11.2. The reduced viscosity value reaches a plateau region at pH 12.5. AA

Soybeans

1236

Matsuura (M) and Obata (A). **β-Glucosidases from soybeans hydrolyze daidzin and genistin.** *Journal of Food Science* 58(1); 1993; 144-147

1237

Kudou (S), Uchida (T) and Okubo (K). **Effect of *Aspergillus niger* on soybean saponins.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(9); 1991; 835-841

In order to improve tastes of soybean foods, enzymatic hydrolysis was investigated of soybean saponins as principal constituents possessing undesirable bitter and astringent tastes in soybeans. Microorganisms producing a soybean saponin hydrolyzing enzyme were screened by using 54 strains of *Aspergillus niger*. As a result, *A. niger* 7122 possessing the highest hydrolyzing activity among all strains was selected. The enzymatic hydrolysates from soybean saponins were examined with TLC and HPLC analyses. The soybean saponin A group was partially deacetylated at terminal sugar moieties of the sugar chain linked to C-22 of soya sapogenol A. Other soybean saponins are likely to be hydrolyzed at the glucuronide bond as a result of soyasapogenol B and E being detected in the hydrolysates. Also this result suggested that novel saponins with soyasapogenol E as aglycone might exist in the intact soybeans. The optimum pH for hydrolysis of Bb, a major saponin, was pH 5.0 to 5.5. The enzyme activity was stable at temperatures below 40°C and stable over the pH range of 4.0 to 6.0. AA

1238

Hayashi (N), Hayakawa (I) and Fujio (Y). **Texture evaluation of dehulled whole soybean extrudate treated with a twin-screw extruder.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(9); 1991; 842-849

Extrusion cooking of dehulled whole soybean, containing ca. 20% oil, was done through a twin-screw extruder equipped with a cooling nozzle. The effect of various parameters as barrel temp., feed rate and screw speed on the textural quality of the extrudate was investigated and evaluated using the values of shearing force measured with the "blade shear cell" and "physical structure index" which was a modified version of Integrity Index of the FNS test. The concept of "orientation index" or the ratio of parallel to cross-sectional value of blade shear force was introduced, expressing the fiber orientation of extrudate which was strongly affected by the feed rate. The main factor affecting texturization of dehulled whole soybean was found to be barrel temp., optimum at 160°C. AA

Soy products

1239

Kulkarni (SD) and Joshi (KC). **Potato starch soy blends: Possible effects of starch properties on few aspects of end products.** *Indian Food Packer* 46(4); 1992; 38-47

Describes the properties of potato starch; their utilization in soybased foods like baked, extruded and traditional type; and the advantages of potato-soy blend products which are more nutritious with high protein, oil and starch, require less cooking energy and have better quality, shelf-life and sensory appeal. GS

Soy milk

1240

Nsofor (LM) and Maduako (O). **Stabilized soy milk for ambient tropical storage: A preliminary report.** *International Journal of Food Science and Technology* 27(5); 1992; 573-576

The shelf-stability of soy milks prepared from sterilized (121°C for 15 min) water-soluble extracts of sprouted-blanched, sprouted-unblanched, and blanched whole soybeans (control) was evaluated; samples were compared for coagulation, pH, and loss of starch. The extract from sprouted-blanched soybeans remained uncoagulated for 6 wks in ambient tropical storage, showed the greatest loss of starch and had the least total solids content (10%). The sprouted-unblanched soybeans produced an extract which coagulated instantly after sterilization at a pH of 5.6, the lowest pH value for treatment and control samples. The control contained the highest total solids (25%), showed least loss of starch and coagulated after 2 days in ambient tropical storage. AA

1241

Murti (TW), Bouillanne (C), Landon (M) and Desmazeaud (MJ). **Bacterial growth and volatile compounds in yoghurt-type products from soymilk containing *Bifidobacterium* ssp.** *Journal of Food Science* 58(1); 1993; 153-157

Soy milk is a favourable medium for the development of bifidobacteria and of mixed cultures traditionally used to manufacture yoghurt. The acidity of soy yoghurt and soy yoghurt + bifidobacteria was acceptable for consumers since the value did not exceed 9 g of lactic acid/kg product. In addition, the pH was 4-4.5, within the range considered optimal for aroma development. *Bifidobacterium* SSP, caused a slight increase in the acidity of the two cultures. Its presence in cow milk favoured both the streptococci and lactobacilli. In soy milk, bifidobacteria favoured growth of only streptococci. Quantities of volatile products in yoghurt/yoghurt + bifidobacteria were slightly lower than those in yoghurt/soy yoghurt. In all cultures, n-hexanal was almost totally absent. SRA

Soy proteins

1242

Satija (V), Sood (SM), Sekhon (BS) and Singh (R). **Effect of sodium dedecyl sulphate on 7S fraction of soybean.** *Journal of the Indian Chemical Society* 69(6); 1992; 348-350

Reports the effect of sodium dodecyl sulphate (SDS) on gel-filtration pattern, ultraviolet difference spectra and reduced viscosity of soybean 7S protein. The reduced viscosity gradually increased with increasing concn. of SDS and attained a value of 8.34 ml/g at 10.41 mM SDS concn. Addition of SDS beyond this concn. precipitated the protein. Rapeseed protein showed a max. value of 10.4 ml/g at 17.34 mM SDS, mustard protein showed a steady value of 11.5 ml/g at 17.34 mM SDS concn. Elution profile of gel filtration pattern of 7S protein in the presence of various concn. of SDS indicated that absorbance at 280 nm decreased by higher SDS concn. SRA

1243

Hayashi (N), Hayakawa (I) and Fujio (Y). **Hydration of heat-treated soy protein isolate and its effect on the molten flow properties at an elevated temperature.** *International Journal of Food Science and Technology* 27(5); 1992; 565-571

The relationship between the flow properties of soy protein isolate (SPI) at 140°C, measured using an extrusion viscometer, and changes in the hydration state were investigated. The state of the water in SPI was analysed by measurement of the freezable water content using differential scanning calorimetry (DSC) and by spin-spin relaxation rate (R2) measurements using pulsed NMR. The dependence of the flow properties on the state of water was indicated by the correspondence between the water content at which the flow characteristics of molten SPI changed, and the critical water content indicated by DSC measurement of the minimum freezable water content, and by the inflection point in NMR measurement of the spin-spin relaxation rate (R2). AA

1244

Genovese (MI) and Lajolo (FM). **Composition and structural characteristics of isolated soy proteins**

from broken and damaged seeds. *Journal of Food Science* 58(1); 1993; 148-152, 157

Mechanical damage and fungal attack lead to alterations of seed proteins and consequently, their physico-chemical properties. Isolated soy protein (ISP) from the 3 kinds of seeds had a different composition, as indicated by their unfolded proteins, half cystine content and subunit profile. There was indication of occurrence of hydrolysis of the proteins isolated from altered damaged seeds. The densitometric analysis of the 7S and 11 S fractions showed for the 11S fraction the total acid and basic subunits represented approx. 75% of the total isolated protein. For the 7 S fraction the sum of α, a' and β-subunits was only 55% of the total for normal and broken and less (39%) for damaged seeds. Isolation and characterization of 7S and 11S fractions partially accounted for changes in physico-chemical properties of the ISP. AA

TUBERS AND VEGETABLES

1245

McDonough (C), Gomez (MH), Lee (JK), Waniska (RD) and Rooney (LW). **Environmental scanning electron microscopy evaluation of tortilla chip microstructure during deep-fat frying.** *Journal of Food Science* 58(1); 1993; 199-203

When the baked chip was immersed in the fryer, oil immediately coated and clung to the surface and began to move into the chip. As heat built up within the chip, the moisture turned to steam and exited the chip leaving behind a sponge-like network of tunnels which became filled with oil. The transformations occurred within 20 sec. As frying time increased, (1) starch granules with strong birefringence remained on the surface of the chip, (2) starch granules lost birefringence within the chip, and (3) the interior of the chip became smooth and plastic in appearance as protein, starch and lipids interacted to form a continuous phase that hardened upon dehydration. AA

Root vegetables

Carrots

1246

Ramana (SV), Wright (CJ) and Taylor (AJ). **Measurement of firmness in carrot tissue during cooking using dynamic, static and sensory tests.** *Journal of the Science of Food and Agriculture* 60(3); 1992; 369-375

The suitability of an oscillatory shear technique to distinguish the rigidity of carrot tissue of different maturity and morphological origin has been evaluated. The rigidity was related to apparent G'(G' = shear modulus) of tissues and growing regions showed greater rigidity than mature tissue. Despite these differences in raw tissue, all samples exhibited a rapid decline in apparent G' around 55-60°C when small discs of these tissues (2 mm thick x 13 mm dia) were heated from 20 to 80°C. Force-compression studies on carrot tissue were performed using a TA.XT2 texture analyser. Carrot discs (3 mm thick x 20.6 mm dia) showed a linear elastic region up to 37% of compression at 20°C. When discs of carrot tissue were heated in the range 20-80°C, they showed a gradual decline in modulus of elasticity (E) unlike apparent G'. Heated-stage microscopic studies were carried out to examine the reasons for rapid changes in G' of carrot tissue during heating. As the temp. increased from 20 to 60°C, thickening ofthe cell wall was observed with disruption of plasma membrane and loss of cellular integrity evident around 60°C. The relationship between sensory analysis and the rheological parameters was also studied. There was a gradual decline of both the apparent G' and E values as well as the sensory score as carrots were cooked in boiling water but, after 20 min, plateau values were observed. There was a linear relationship between sensory score and apparent G' and E values (r = 0.86 to 0.93) suggesting the instrumental methods used in this investigation were able to measure the same intensity of textural characteristics as perceived by a taste panel. AA

1247

Babic (I), Hilbert (G), Nguyen-The (C) and Guiraud (J). **The yeast flora of stored ready-to-use carrots and their role in spoilage.** *International Journal of Food Science and Technology* 27(4); 1992; 473-484

Spoilage of ready-to-use grated raw carrots packaged in polymeric films and stored at 10°C was investigated for involvement of yeasts. *Cryptococcus albidus* was only isolated during the first 3 days of storage, increasing to levels of 10^5 - 10^6 g^{-1}. *Candida lambica* was more commonly isolated after 3-7 days of storage, and reached 10^7 - 10^8 g -1 after 12 days. *C. sake* was present throughout storage, increasing from 10^5 - 10^6 after 3 days to 10^7 - 10^8 after 12 days. In some samples, *Candida parapsilosis* and *Candida tropicalis* were also isolated at levels similar to *C. sake*. All the yeasts isolated at the end of storage were fermentative species and their metabolism was characterized with a Warburg appartus. Neither the number or yeasts nor the composition of the yeast flora were related to the deteriortion of the product. Although *C. lambica* inoculated on grated carrots caused spoilage after 12 days at 10°C, the high O_2

permeable film was most effective in reducing exudate. AA

Cassava

1248

Waliszweski (KN), Alvarado (MG) and Medina (JDLC). **Kinetics of enzymic hydrolysis of cassava flour starch - optimization and modelling.** *International Journal of Food Science and Technology* 27(4); 1992; 465-472

The kinetics of cassava flour hydrolysis was modelled using Miles Taka-Therm L-170 alpha amylase and Diazyme L-200 glucoamylase to produce glucose syrup. Max. starch concn. was 33% due to a controlled process of flour gelatinization by gradual temp. increase, and parallel starch hydrolysis by thermostable alpha-amylase activity, preventing excess viscosity. The time of hydrolysis was two and half hours of alpha-amylase activity and 36 h of glucoamylase activity with the final yield of 90-93% of glucose. Exponential hyperbolic models were obtained to predict the kinetic of hydrolysis both amylase and glucoamylase with a generalized correlation coeff. > 0.94. GS

Tubers

Potatoes

1249

Magee (TRA) and Wilkinson (CPD). **Influence of process variables on the drying of potato slices.** *International Journal of Food Science and Technology* 27(5); 1992; 541-549

Investigation of the effects of varying air velocity, slice thickness, and pre-treatment with NaCl chloride solutions and surface active agents on drying potato slices indicated that the drying occurred entirely in the falling rate period and was controlled by the mechanism of liquid diffusion. The rate of drying, and therefore the diffusion coeff., increased with the addition of Nacl and surface active agents. Diffusion coeff. were also influenced by air velocity and slice thickness, suggesting that the rate of drying of potato slices is controlled by a combination of internal and external resistances. AA

1250

Mondy (NI), Wurm (CM) and Munshi (CB). **Moist and dry heat reduce isopropyl N-(3-chlorophenyl) carbamate (CIPC) residue in potatoes.** *Journal of Food Science* 58(1); 1993; 132-133, 163

Moist (boiling and pressure-cooking) and dry heat (baking with and without foil, and microwaving) were compared as to their effect on CIPC retention in potatoes. Tubers were dipped in a 1% emulsion of CIPC for 5 min. prior to processing and stored at 5°C for 0, 1 and 2 months. All processing methods significantly ($p < 0.01$) reduced CIPC residue in potatoes. Moist heat methods reduced CIPC more than dry heat. Boiling resulted in significantly ($p < 0.01$) greater reduction of CIPC than pressure-cooking while baking without foil resulted in greatest reduction of CIPC followed by microwaving and baking with foil. The peel localized 20 times more CIPC residue than the cortex. AA

1251

Okazaki (T), Suzuki (K), Maeshige (S) and Kubota (K). **Kinetic studies on softening phenomena of potato during thermal processing.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(9); 1991; 784-788

Potato samples (7 mm diam. x 30 mm length) were cooked in water at a temperature from 85 to 105°C with a cylindrical heating vessel in a constant temp. bath. Changes in a temp. at the center of the potato were measured with a CA thermocouple. The cooking process consisted of unsteady heating and cooling periods, and constant temp. cooking periods. Since the cooking of potato progressed during the unsteady thermal process, cooking time for it was corrected to the value of cooking time under constant temp. Changes in hardness during cooking were measured as an index for cooking value. The hardness of potato was slightly increased (about 14% of initial value) in the initial stage of heating. Then potato softened with time. The softening process was divided into two stages of different mechanisms. The 2nd stage of softening followed with a time interval after the Ist stage. The interval decreased with the increase in cooking temp. Hardness of the sample decreased to about 1/10 of the initial value at the end point of the Ist stage, irrespective of the cooking temp. The softening behaviour in both stages could be analysed with the pseudo-first order rate equation. The activation energies for the Ist and 2nd stages of softening were 171 and 123 kJ/mol, respectively. Logarithmic values of the starting time, t, of the 2nd stage were correlated linearly with cooking temp. T, and expressed as $\log t = 8.85 - 6.33 \times 10^{-3} T$. AA

1252

Liu (H). **A kinetic study of salt diffusion in potato at high temperature.** *International Journal of Food Science and Technology* 27(4); 1992; 443-455

The apparent diffusion coeff. of sodium chloride in potato was determined from the change in average concn. in cylinderical potato pieces with time when surrounded by salt solution of between 1 and 5% concn. Measurements were made at temp. in the range 50-120°C. The apparent diffusion coeff. of salt in potato is temp. dependent and follows the Arrhenius equation, with activation energies of 20-24 kJ mol^{-1}, decreasing with increasing concn. within the temp. range 70-120°C. The apparent diffusion coeff. increases with concn. Below 60°C the Fickian diffusion equation did not predict the experimental results accurtely because of changes in the dimensions and structure of the potato caused by osmosis. AA

Yams

1253

Asemota (HN), Wellington (MA), Odutuga (AA) and Ahmad (MH). **Effect of short-term storage on phenolic content, o-Diphenolase and peroxidase activities of cut yam tubers (*Dioscorea* sp.).** *Journal of the Science of Food and Agriculture* 60(3); 1992; 309-312

The effect of short-term storage on the protein, P and phenolic content as well as peroxidase and o-diphenolase activities of cut, harvested Jamaican yam (*Dioscorea* sp) tubers (*D. rotundata*, *D. alata* and *D. cayenensis*) was studied. There was an initial increase in the total phenolic content up to the third week of storage followed by a gradual decrease to the sixth week. Phenolic content was found to be highest in *D. cayenensis* followed by *D. rotundata* and *D. alata*. The activities of peroxidase (EC 1.11.1.7) and o-diphenolase (EC 1.10.3.1) increased steadily up to the third week of storage and thereafter decreased to the fifth wk. The intensity and rapidity of browning in tubers when cut, correlated very closely with the tuber o-diphenolase and phenolic content levels while the onset of rotting correlated with the peroxidase activity levels in the sp. studied. AA

Vegetables

1254

Poonam Aggarwal and Saini (SP). **Effect of retort processing on the chemical composition and organoleptic quality of ready-to-eat sag prepared from new *Brassica* cultivars.** *Indian Food Packer* 46(4); 1992; 34-37

Physico-chemical changes evaluated during processing of 5 var. of *Brassica*, viz. Toria-ITSA, Brown sarson, Chinese cabbage, RLM-240 and Gobhi sarson, into canned sag indicated that the cv. Brown sarson and RLM-240 were the best for canning into sag due to better flavour and colour retention even after 6 months storage although the 3 other var. were also suitable for cooking and canning. GS

1255

Majeed (SA) and Nagegowda (V). **Vegetable production: Time for new strategies.** *Indian Food Packer* 46(5); 1992; 35-44

Outlines the place of India in world vegetable production (second, next to China, with a production of about 48 million t.); constraints in vegetable production, strategies for increasing production; role of processing industries; yield of vegetable crops in different regions of the world; export potential of vegetable crops from India; and new projects to improve vegetable production and processing in India. GS

Broccoli

1256

Barth (MM), Kerbel (EL), Perry (AK) and Schmidt (SJ). **Modified atmosphere packaging affects ascorbic acid, enzyme activity and market quality of broccoli.** *Journal of Food Science* 58(1); 1993; 140-143

The effects of elevated CO_2 concn, developed during modified atm. packaging, on ascorbic acid and chlorophyll content, enzyme activities and texture of broccoli during simulated retail conditions (10°C) was studied. Concn. with in packages monitored by GC were 8% CO_2 and 10% O_2. Packaging of broccoli spears resulted in greater ascorbic acid retention providing better vitamin C content for the consumer, and greater chlorophyll retention contributing to greener appearance. Packaging with polymeric films was found acceptable for postharvest storage. SRA

Leafy vegetables

Amaranthus caudatus

1257

Sweet (SS) and Guruprasad (KN). **Regulation of betacyanin synthesis by GA3 and CCC in *Amaranthus caudatus* L.** *Indian Journal of Experimental Biology* 31(2); 1993; 168-172

Betacyanin synthesis in *A. caudatus* seedlings is inhibited by gibberellic acid (GA3) and promoted by cholorocholine chloride (CCC). When both substances are given together, CCC reverses the inhibition caused by GA3. A greater amount of total free amino acids, in particular tyrosine, was present

in CCC treated seedlings, while GA3 treated seedlings showed a lower level of total free amino acids and tyrosine compared to controls grown on distilled water. In experiments with radioactive precursor of the pigment 14C-tyrosine, GA3 enhanced incorporation of precursor to protein while CCC enhanced incorporation into betacyanin. CCC also reversed the effect of GA3 on diversion of 14C-tyrosine away from the site of pigment synthesis. It is suggested that GA3 and CCC regulate the synthesis of betacyanin by causing the diversion of precursors. AA

Pumpkin

1258

Essien (AJ), Ebana (RUB) and Udo (HB). **Chemical evaluation of the pod and pulp of the fluted pumpkin (*Telfairia occidentalis*) fruit.** *Food Chemistry* 45(3); 1992; 175-178

Analysis of fresh pod and pulp showed moisture, (91.30%, 92.80%), crude protein (1.40%, 1.30%), crude fibre (0.85%, 0.46%), ether extract (0.50%, 0.30%), ash (0.40%, 0.30%) and nitrogen-free extract (5.60%, 4.84%) respectively. Fermentation (0.120 h) increased the percentage crude protein, decreased the crude fibre and ether extract contents. Mineral elements in pod and pulp were Na (10.50; 27.50), K (1584; 2320), Mg (665.90; 147.20), Ca (196.7; 182.10), P (30.00; 260.00), Fe (16.76; 13.86), Zn (5.31; 4.30), Cu (1.26; 1.13) and Mn (0.07; 0.06) mg/100 g dry matter. SD

Tomatoes

1259

Porretta (S), Carpi (G), Dall'Aglio (G) and Ghizzoni (C). **Use of ultrafiltration for preparing improved tomato pulp.** *International Journal of Food Science and Technology* 27(4); 1992; 427-433

The characteristics of high-quality tomato pulp (commercial def.: crushed or diced tomatoes with about 30% tomato juice as packing medium) canned with tomato juice pulp enriched by ultrafiltration as packing medium were compared with those covered with conventional vacuum-concentrated juice. Both hot- and cold-break products were prepared and those containing 20% serum-reduced packing juice proved to be the best, showing no signs of syneresis on storage and with improvements in sensory properties, colour and non-enzymatic browning; some volatile components were reduced. AA

FRUITS

1260

Eipeson (WE) and Bhowmik (SR). **Indian fruit and vegetable processing industry - potential and challenges.** *Indian Food Packer* 46(5); 1992; 7-12

Reports the production statistics of fruit and vegetables in leading countries. India stands second after Brazil in fruit production (27.8 million t.). Mango occupies the top position with an annual production of 10 million t. (65% of the world mango production), followed by banana, citrus, grapes, apples, pineapples and guava. Among vegetables potato occupies the top most place with 16 million t. production, followed by tapioca, onion, okra, tomato, knolkhol, cabbage, brinjal and garlic. Minor fruits grown in India; output and share of some major FPO licences; per capita consumption of fruit juice and nectar in world markets (1985-1989); market potential, technology upgradation, policy support and future trends of the industry are also presented. GS

1261

Kejriwal (NM). **Development of fruit and vegetable processing industries and their export potential.** *Indian Food Packer* 46(5); 1992; 13-19

Outlines the situation relating to poor fruit/vegetable yields and the potential for better yield in India or abroad; the estimated land degradation due to deforestation in late 1970s; trends in the production of fruits and vegetables in India; post-harvest losses of tuber, fruits and vegetables; quantity of different fruit and vegetable products produced by FPO licences; export of major fruit and vegetable products and major destinations and future trends in fruit and vegetable trade. GS

1262

Prahlad (SN). **Emerging trends in the fruit and vegetable processing industries-industry/university co-operative research.** *Indian Food Packer* 46(5); 1992; 32-34

Presents the problem of Indian food processing industries due to lack of infrastructure such as quality power supply, high cost of energy, poor road transport conditions and inadequate storage facilities in the port. Suggests the development of University/Industry cooperative research programmes in food processing industry at national and regional level with the initiative of Government of India. GS

1263

Jain (A). **Prospects of fruits and vegetable processing units in Rajasthan.** *Indian Food Packer* 46(5); 1992; 93-98

Rajasthan produced 1,09,023 t. of fruits, 2,88,152 t. of vegetables and 2,80,190 t. of spices during 1990-91. Hence, a number of industrial units for the processing of fruits like mango, lemon, orange, mosambi, Kinnow, malta, guava and pomegranate, vegetables like potato, tomato, onion and brinjal, spices like cumin, fennel, fenugreek, garlic, ajowan and ginger were set up. The 135 fruit and vegetables processing industries registered with the Directorate of Industries in Rajasthan are presented district wise. The infrastructural facilities, credit facilities, good power and water availability provided by the Rajasthan government are outlined and suitable locations for further establishment of fruit and vegetable processing industrial units are mentioned. GS

1264

Thakur (S). **Development of fruit and vegetable industry in Himachal Pradesh.** *Indian Food Packer* 46(5); 1992; 99-100

Reports the installation of fruit processing industries at Jarol, Jabli, Parwanoo in Himachal Pradesh, the encouragement given to large scale units like Himprocess and Modern Foods; the growth of cider and fruit based wine industries; the preferential allotment of land for fruit-based units; government subsidy for fruit based units for installation, market promotion, participation in exihibitions, advertisement etc. GS

1265

Pandhi (DP). **Role of the state for the growth of the fruit and vegetable processing industries.** *Indian Food Packer* 46(5); 1992; 101-102

Introduction of suitable hybrid tomatoes for different processed products; the establishment of 18 community canning centres to train workers; increasing the production area of fruit crop in the 8th plan; the encouragement given to Orissa Agro Industries Corporation (OAIC) for modernisation and OAIC in turn gives encouragement to private enterpreneurs to start fruit/vegetable processing industries are some of the steps taken by the Orissa State Government for the growth of fruit and vegetable processing industries. GS

1266

Basu (CK). **Role of States in the growth of fruit and vegetable processing industries.** *Indian Food Packer* 46(5); 1992; 108-109

The steps taken by Government of India for the growth of food proessing industries are liberalisation of export-import policy; simplification of procedures for industrial clearance and approvals; development of processed fruit/vegetable products like pulps, juices, dehydrated RTS beverages, pickles, preserves, chutney, sauces and concentrates; improvement of frozen fruit/vegetable industry and educating the consumers on the use of processed food. GS

1267

Mallorca (R), deLeon (SY) and Lim-Sylianca (CY). **Free glutamic acid in some Philippine fruits and vegetables.** *ASEAN Food Journal* 7(2); 1992; 108-110

The glutamic acid (mg/100 g, edible portion) contents of some fruits and vegetables of Philippine. Fruits: avocado (*Persea americana* Mill.)-8, pineapple (*Ananas comosus* (Linn.) Merr. - 20, sugar apple (*Anona squamosa* Linn.) - 20, water melon (*Citrullus vulgaris* Schrad.) - 10. Vegetables: celery (*Apium graveolens* Linn.) - 60, fragrant screw pine (*Pandanus odoratissimus* Linn.) - 30, ginger (*Zingiber officinale* Rosc.) - 20, Horse radish tree (*Moringa oleifera* Lam.) - 200, long bean (*Vigna sinensis* Fruw) - 60, Malabar night shade (*Basella rubra* Linn.) - 309, Winged bean (*Psophocarpus tetragonoalobus* Linn.) - 30. BV

Bananas

1268

Esguerra (EB), Kawada (K) and Kitagawa (H). **Ripening behaviour of 'Senorita' bananas at different temperatures.** *ASEAN Food Journal* 7(2); 1992; 79-85

This study characterises the physiological and physico-chemical changes in ethylene-treated 'Senorita' bananas during ripening at different temp. (15, 20, 25, 30 and 35°C) and the influence of fruit quality on the ripening pattern at each temp. was assessed. Bananas held at 35 and 30°C exhibited a continuous rise in respiration upon exposure to air. Respiration rates at these temp. were highest 2 days after C_2H_4 treatment when the fruit was at pulp colour index (PCI) 3 to 4. At 15°C, no defined respiratory climacteric was observed and ripening proceeded at a slow rate. The highest reduction in starch content both the peel and the pulp occurred at PCI2 concomitant with the increase in total and reducing sugars for all temp. evaluated. The high tannin content decreased upon ripening. Rate of ripening was more uniform at 25°C, and the peel appearance and pulp

constituents were most acceptable at this temp, but shortened the shelf-life. SRA

1269

Saca (SA) and Lozano (JE). **Explosion puffing of bananas.** *International Journal of Food Science and Technology* 27(4); 1992; 419-426

Banana slices were dehydrated by incorporating explosion puffing into the drying process. Water contents in the range 27-38%, steam temp. of 152-160°C, internal pressures of 0.8-1.0 kg cm^{-2} and residence times of 1 min were explosion puffing conditions. Initial and final drying were performed with hot air at a temp. of 70°C, velocity 3.6 ms^{-1} and RH 35%. The increase in porosity obtained by puffing reduced the total drying time compared with conventional air dried samples. GS

Carambola

1270

Sankat (CK) and Balkissoon (F). **The effect of packaging and refrigeration on the shelf life of the carambola.** *ASEAN Food Journal* 7(2); 1992; 114-117

Guava

1271

Chan (W-Y) and Chiang (B-H). **Production of clear guava nectar.** *International Journal of Food Science and Technology* 27(4); 1992; 435-441

Three fining methods were tested for use in producing clarified guava nectar. The enzyme hydrolysis method, especially treating the guava puree with 1000 p.p.m. of pectinase at 50°C for 3 h, accomplished satisfactory clarification but caused severe losses in volatile components, pre-treating the puree with 100 p.p.m. of pectinase for 1 h greatly facilitated the subsequent bentonite or ultrafiltration clarification processes, and both the bentonite treatment and the ultrafiltration process yielded clarified product, but the ultrafiltered product had less loss of volatiles. However, to achieve storage stability, a membrane of lower than 100000 dalton mol. wt. cut-off should be used. AA

Mangoes

1272

Pruthi (JS). **Simple innovations in mango processing technologies.** *Indian Food Packer* 46(5); 1992; 45-55

Describes trends in the production of 15 conventional mango products in India; newer processing technologies of mango products; technological development in unripe mango products; solar drying of green mango slices in a tent-type solar drier; exports of mango products and 'Amchur' (dried/peeled unripe mango powder) from India; technologies for newer ripe mango products; analysis of ripe mango aroma; and analysis of proximate composition of Badami mango products. GS

1273

Kumbhar (BK). **Processing of mango in the industry - A Scenario.** *Indian Food Industry* 11(6); 1992; 33-36

The paper gives the details of mango processing plants and mango processing technology as well as the various products manufactured in mango processing industries such as mango pulp, mango slices, mango beverages, jam, mango pickles and mango slices in brine. CSA

1274

Castrillo (M) and Bermudez (A). **Post-harvest ripening in wax-coated Bocado mango.** *International Journal of Food Science and Technology* 27(4); 1992; 457-463

The effect of three different concn. of two commercial wax coatings on some parameters of post-harvest ripening was evaluated. The rate of loss of fresh wt. of mangoes was reduced with both waxes at higher concn. Chlorophyll degradation of the exocarp (skin) and the increase in mesocarp (flesh) pH normally occurring during ripening was retarded at higher concn. of both wax coatings. However Primafresh 31 was less effective than Primafresh C at similar treatment concn. The results showed that the delayed ripening effects of wax -coated fruits affected fresh wt. loss, exocarp chlorohyll degradation and mesocarp pH change but did not affect mesocarp chlorophyll, sugar, and starch content. AA

Nectarines

1275

Lurie (S). **Controlled atmosphere storage to decrease physiological disorders in nectarines.** *International Journal of Food Science and Technology* 27(5); 1992; 507-514

'Fantasia', 'Flavortop', and 'Flamekist' nectarines were examined for their response to controlled atm. (CA) storage. All 3 cv. stored well for up to 6 weeks at 0°C in an atm. of 10% O_2 + 10% CO_2, while some

but not all the cv. also stored well in 2% O_2 + 5% CO_2 or 10% O_2 + 5% CO_2. The physiological storage disorders of internal breakdown and reddening were almost completely absent in nectarines kept in 10% O_2 + 10% O_2. When 'Flamekist' nectarines from 2 harvests were stored in 10% O_2 + 10% CO_2 atm. for 6 or 8 wks at 0°C, the fruit from the first harvest was of better quality after post-storage ripening. Although this controlled atm. prevented internal breakdown and reddening, after extended storage fruit did not develop the increased soluble solids content or extractable juice during post-storage ripening that occurred in non-stored fruit. Therefore, while preventing storage disorders, CA does not reduce the loss of ripening ability occurring during nectarines storage. AA

Peaches

1276

Lyon (BG), Robertson (JA) and Meredith (FI). **Sensory descriptive analysis of cv. Cresthaven peaches - Maturity, ripening and storage effects.** *Journal of Food Science* 58(1); 1993; 177-181

Peaches (cv. Cresthaven), at 3 maturity grades (IM-immature, TM-threshold mature, and MA-mature), were evaluated by a trained descriptive analysis panel before and after ripening at 20°C and 85% RH and after storage at 0°C, followed by ripening. Variable Cluster Analysis indicated 4 clusters (CL) of attributes that explained > 70% of the variation in the data. CL-I (green, hardness, fracturability) distinguished IM and TM fruit at harvest. CL-II (peachy, sweet, fruity, juiciness) showed that IM ripened fruit did not attain a comparable intensity of these notes as did ripened TM or MA fruit. Intensity of flavour changes due to ripening and storage depended on maturity of fruit when it was harvested. AA

Plums

1277

Saini (SPS) and Wani (MA). **Enzymatic clarification of plum pulp for higher concentration.** *Research and Industry, India* 38(1); 1993; 19-22

Study was conducted on the enzymatic clarification of plum pulps from Alubukhara, Santa-Rose and Satsuma cv. of plum. Juice yield obtained from hot break pulp was higher than cold extracted pulps in all the 3 plum var. Pectinolytic enzyme treatment yielded clear bright juice with thin consistency having no residual pectin. It also caused reduction in viscosity. Tintometric colour studies of RTS-drinks proved that enzymatically clarified juice from hot extracted pulps yielded better results. Overall scoring improved further when plum juices were blended uniformly prior to the preparation of their RTS-drinks. Enzymatically clarified juices seem more suitable for higher fold of concn. due to elimination of suspended material. AA

Strawberries

1278

d'Amour (J), Gosselin (C), Arul (J), Castaigne (F) and Willemot (C). **Gamma-radiation affects cell wall composition of strawberries.** *Journal of Food Science* 58(1); 1993; 182-185

Irradiation of strawberries at 4 kGy caused extensive tissue softening and partial degradation of cell wall polysaccharides. Cellulose and the polygalacturonic acid chains of the pectic fractions were more affected than neutral sugar side chains of the pectic and hemicellulose fractions. SRA

CONFECTIONERY, STARCH AND SUGAR

Sugar

1279

Banerji (RK) and Ajay (G). **A comparison of non-linear regression algorithm with various mathematical methods used to calculate first order BOD equation constants for sugar mill effluents.** *Indian Sugar* 42(8); 1992; 597-602

The values of K' and Lo first stage first order BOD kinetic constants for sugar mill effluents determined through the program for boiling house effluent are 0.13 day-1 and 1048 mg/l; for mill house effluent 0.21 day-1 and 1070 mg/l and for combined mill effluent 0.21 day-1 and 1449 mg/l respectively. On the basis of the kinetic constants, the total time required to decompose the organic matter to discharge limit of 30 mg/l by self purification process is estimated to be 27.3, 17.0 and 18.5 days for boiling house effluent, mill house effluent and combined mill effluent respectively. SRA

Sugarcane

1280

Patel (MS), Koria (RG) and Polara (JV). **Effect of location and varieties on sugarcane + chemical - composition and quality of juice.** *Indian Sugar* 42(7); 1992; 445-447

Field experiments conducted on sugarcane var. Co 6304, Co 6907, Co 6806, Co 6902, CoA 7602, Co 7708, Co 7804, Co 7806, CoC 671 and Co 419 in

Junagadh and Kodinar locations on calcareous clay soils, revealed that irrespective of the location, the glucose content was highest in the var. Co 419 followed by var. Co 6304 and Co 7804. Highest and lowest sucrose contents were recorded in the var. CoC 671 and Co 6304 respectively in both locations. In general, the content of N, K, Ca, S, Fe, Zn and Cu was higher by 4, 79, 64, 10, 12, 10 and 71% at Kodinar than that Junagadh. The content of P and Mg was higher by 15 and 13% under Junagadh condition than that Kodinar respectively. Var. CoC 671 is considered as most suitable for Saurashtra region of Gujarat. SRA

1281

Ahmed (R) and Khan (AQ). **A new empirical formula for estimation of sugar recovery in sugarcane.** *Indian Sugar* 42(8); 1992; 627-630

An empirical formula developed estimates sugar recovery in sugarcane on the basis of juice extraction % and lowest exhaust molasses purity. Sugar recovery % cane [S-(B-S) 0.32] F' where S and B = sucrose and brix % juice, 0.32 is a constant derived from lowest exhaust molasses purity in unit. F' = 2E - Z2/0.84. F' is the factor which represents the max. available juice per unit cane. 0.84 is the constant for max. juice recovered at 0.1 fiber per unit cane. This new formula would be most useful for estimation of sugar recovery in sugarcane var. with small cane sample and without the need for detn. of fibre % cane involving a cumbersome process. SRA

BAKERY PRODUCTS

1282

Kamel (BS) and Stauffer (CE). **Advances in baking technology.** 1-408; 1993

Reviews recent advances in the baking industry with particular emphasis on developments in ingredients and processes. Various chapters covered include wheat and wheat flour by Bushuk, W and Scanlon, M.G. (pp 1-19); Rye flour, wholemeal breads and rye breads by Prihoda, J., Holas, J. and Kratochvil, J. (pp. 20-37); Advances in breadmaking technology by Brown, J. (pp. 38-87); Frozen dough production by Stauffer, C.E. (pp. 88-106); Dough rheology and physical testing of dough by Rasper, V.F. (pp. 107-133); Texture measurements on finished baked goods by Bourne, M.C. (pp. 134-151); Enzymes and dough improvers by Kulp, K. (pp. 152-178); Emulsifiers in baking by Kamel, B.S. and Ponte, J.G. Jr. (pp. 179-222); Lecithin and phospholipids in baked goods by Silva, R. (pp. 223-253); Sensory evaluation by Setser, C.S. (pp. 254-291); Microwave technology in baking by Schiffmann, R.F. (pp. 292-315); Extrusion of baked products by Miller, R.C. (pp. 316-335); Fats and fat replacers by Stauffer, C.E. (pp. 336-370); Dietaryfiber, analysis physiology and calorie reduction by Stauffer, C.E. (pp. 371-398). Also covers the subject index (pp. 401-408). CSA

1283

AFST(I) (Mysore). **Developments in milling and baking technology.** 1-134; 1991

Different topics covered in this volume are wheat varieties vis-a-vis end-use proportion - present Indian scenario by Hanslas, U.K. and Sangeeta Gupta (pp. 107); Storage, handling and distribution of wheat by Shivanna, C.S. (pp. 8-13); Diseases in wheat in relation to milling and baking quality by Sekhon, K.S. and Narpinder Singh (pp. 14-25); Opportunities for variety in baked products by Sullivan, J.W. (pp. 26-30); Indigenous machinery for bread production by Kale, K.B. (pp. 31-35); Trend in bread processing and Indian situation by Mithander, V.B. (pp. 36-40); Bakery fats by Chandrasekharan (pp. 41-43); Utilization of by-products of flour milling industry by Shurpalekar, S.R. (pp. 44-54); Recent advances in Chemistry of wheat proteins in relation to end-products by Sidhu, J.S., Bhupender Singh and Bajaj, M. (pp. 55-62); Wheat based traditional Indian foods by Anja, S.S. (pp. 63-68); Diversification of bakery products in small scale sector-need and possibilities by Selvarajan, G. (pp. 69-72); Baking industry - Trends and opportunities by Shaw, J.C. (pp. 73-80); Indian commercial flours and their response to additives by Menon, C.P.S. (pp. 81-87); Quality standards of bakery products - problems and perspectives by Jayaram, R. (pp. 88-91); Need for trained personnel for the production of quality milled products, by Krishnaiah, M.M. and Venkateswara Rao, G. (pp. 92-94); Preservatives for extending the shelf-life of wheat based products by Vidyasagar, K. (pp. 95-101); Problems related to Indian baking Industry in small scale sector by Lawrence, J. (pp. 102-106); Bakery industry by Narayanan, P.V. (pp. 107-111); Marketing of bakery products (pp. 112-122); Problems in marketing of products of small scale bakery units by Langer, S.S. (pp. 123-127); Role of Small Industries Service Institute in promotion and modernisation of small scale bakery industry in the country by Adsule, P.G. (pp. 128-132); Bakery products as carriers of nutrition by Achaya, K.T. (pp. 133). CSA

1284

Gothwal (PP) and Bhavadasan (MK). **Studies on the browning characteristics in dairy products.** *Indian Journal of Dairy Science* 45(3); 1992; 146-151

This study reports the change in browning as estimated by pronase method during storage of khoa, condensed milk, skim-milk powder and sterilized milk. Khoa prepared from buffalo milk showed higher total solids and browning than that made from cow milk. Market samples of khoa showed wide variation in composition and browning. Generally a higher browning rates than samples prepared in laboratory was observed. The browning rate of khoa was slow during storage. Browning of condensed milk increased with storage time, temp. and viscosity. Skim-milk powder showed increase in browning and loss in available lysine on storage (> 30°C). Milk sweetened or unsweetened, stored in sterilized bottle, showed no appreciable change in browning. SRA

Milk

1285

Lawless (HT) and Claassen (MR). **Validity of descriptive and defect-oriented terminology systems for sensory analysis of fluid milk.** *Journal of Food Science* 58(1); 1993; 108-112, 112

Fluid milk defects were evaluated by 2 trained sensory panels, one generating their own associative descriptive terms (PG) and the second using traditional dairy judging terminology (TT). The same samples were evaluated by a consumer acceptance panel. The trained panels had equal levels of discriminative ability as shown by ratings of untreated, oxidized and rancid milks. The PG system had as good or better correlation with consumer acceptability ratings as the TT system, as determined by multiple regression, especially when more than one defect was present. Discriminant analysis showed that descriptive profiles obtained by either trained panel could be used to identify defects by their actual root causes, and that the classification accuracy of the descriptive panel surpassed that of the defect-oriented group. AA

1286

Herrero (MA), Atienza (J), Maquieira (A) and Puchades (R). **Flow injection spectrophotometric determination of calcium, phosphate and chloride ions in milk.** *Analyst (London)* 117 (6); 1992; 1019-1024

Flow injection procedures for the detn. of Ca, phosphate and chloride ions in milk samples are described. The reactions are based on the formation of coloured complexes and their spectrophotometric monitoring. A sample pre-treatment with acetate buffer was carried out owing to the complexity of the sample matrix. For chloride, a rapid and reliable automated procedure for direct measurement of its content in milk (using a dialyser to eliminate interferenes) is also described. After optimizing the sample pre-treatment and flow injection variables, the procedures were applied to commercial milk; the results obtained agreed satisfactorily with those of the reference methods. With 50 mm^3 samples, a working range of 0-15 p.p.m for ca, 50-150 p.p.m for phosphate and 5-100 p.p.m for chloride is covered with a precision of better than 1.1%. The sample throughput was higher than 50 samples h^{-1}. These preliminary experiments are the basis for the automation of the detn. of Ca, phosphate and chloride ions using a computer-controlled, self-designed and laboratory-built autoanalyser. AA

1287

Raats (MM) and Shepherd (R). **Free-choice profiling of milks and other products prepared with milks of different fat contents.** *Journal of Sensory Studies* 7(3); 1992; 179-203

Free-choice profiling was adopted to evaluate milks of different fat content and food products such as cornflakes, flavoured milk, instant coffee, oat cereal, savoury sauce, tea and whipped dessert prepared from them. The milks of different fat content, flavoured milk, cornflakes, savoury sauce, and tea showed significant difference from each other. While instant coffee, oat cereal and whipped desserts did not. The samples with different fat content were profiled as 'thin/watery', 'buttery/fatty/greasy/oily', coating/clinging' and 'creamy/rich'. SD

1288

Jung (D-S), Bodyfelt (FW) and Daeschel (MA). **Influence of fat and emulsifiers on the efficacy of nisin in inhibiting *Listeria monocytogenes* in fluid milk.** *Journal of Dairy Science* 75(2); 1992; 387-393

The recent FDA affirmation of nisin, an antimicrobial peptide, as a GRAS (generally recognized as safe) additive in pasteurized cheese spreads has renewed interest in its potential application in US dairy products. Fluid milks were prepared with varying concn. of milk fat (0 to 12.9%) and of nisin (0 to 50 μ/ml). Biological activity assays using a sensitive indicator microorganism in a well

diffusion system indicated that initial nisin activity (50μ/ml) decreased by about 33% when it was added to skim milk and by more than 88% when added to milk containing 12.9% fat. Nisin activity decreased by ca. 50% in milk containing 1.29% fat. Milks containing 0, 10, or 50 μ/ml of nisin and varying fat percentages were challenged with approx. $\log_{10}$ 7 to 7.5 cfu/ml of log phase *Listeria monocytogenes* Scott A or Jalisco. At 2 h after inoculation, the viable count of *L. monocytogenes* Scott A decreased to $\log_{10}$ 30 cfu/ml in skim milk with 50 μ/ml of nisin, decreased to $\log_{10}$ 2.90 cfu/ml in skim with 10 μ/ml of nisin, and increassed slightly ($\log_{10}$ 7.8 cfu/ml) in skim milk without nisin. In half-and-half (12.9% milk fat), nisin was far less effective in inhibiting *Listeria* with populations decreasing to $\log_{10}$ 6.57 cfu/ml for 50 μ/ml. Similar results were obtained with *L. monocytogenes* Jalisco. The nonionic emulsifier, Tween 80, partially counteracted decreases of nisin activity in milks, whereas the anionic emulsifier, lecithin, had no effect. Addition of Tween 80 significantly increased the activity of nisin against *L. monocytogenes* in milk regardless of fat content. AA

1289

Banon (S) and Hardy (J). **A colloidal approach of milk acidification by glucono-δ-lactone.** *Journal of Dairy Science* 75(4); 1992; 935-941

Colloidal techniques (laser Doppler electrophoresis, particle size analysis, and capillary viscosimetry) were used in combination with a turbidimetric method to study milk acidification by glucono-ô-lactone. In agreementtn with a previous paper, micellar phenomena as a whole can be related to the turbidimetric observations, and it appears possible to hypothesize a logical developmenttn of milk acidification at the micellar level. The observed electrokinetic and hydrodynamic compartment of micelles can be explained by the presence of an outer hairy layer. Then, as for renneting, ethanol, or thermal milk treatments, the micellar destabilization by acidification could largely depend upon the collapse of this outer hairy layer. Thermal motion should be a major factor for aggregation of particles because increasing temp. leads to increasing frequency of particle encounters. Casein solubilization from low temp. and acidification seems to act as an additional micellar destabilizing factor. AA

1290

Hosoda (M), Hashimoto (H), Morita (H), Chiba (M) and Hosono (A). **Antimutagenicity of milk cultured with lactic acid bacteria against N-methyl-N'-Nitro-N-Nitrosoguanidine.** *Journal of Dairy Science* 75(4); 1992; 976-981

The antimutagenic effect of cultured milk using 71 strains of lactic acid bacteria belonging to the genus *Lactobacillus*, *Streptococcus*, *Lactococcus*, and *Bifidobacterium* on the mutagenicity of N-methyl-N'-nitro-N-nitrosoguanidine was investigated *in vitro* using *Salmonella typhimurium* TA 100 as an indicator bacterium. Each cultured milk sample displayed its characteristic antimutagenic effect on the mutagenicity of N-methyl-N'-nitro-N-nitrosoguanidine. The milk cultured with *Lactobacillus acidophilus* LA 106 (LA2) showed the highest inhibition of 77% against the mutagenicity of N-methyl-N'-nitro-N-nitrosoguanidine among the strains tested. Changes in the antimutagenic effect of the milk cultured by *Lb. acidophilus* LA 106 (LA2) during incubation were also examined using N-methyl-N'-nitro-N-nitrosoguanidine as a mutagen. AA

Milk products

1291

Batish (VK), Grover (S) and Neelankantan (S). **Improving shelf-life and safety of fermented milk products through genetically improved microorganisms.** *Indian Dairyman* 45(2); 1993; 51-57

Bacteriocins of lactic acid bacteria are very useful in food preservation and also in the production of a variety of fermented foods such as *dahi*, *shrikhand*, *lassi*, *leben*, yoghurt, cheese, *kumiss*, kefir and cultured milks. The involvement of plasmid in bacteriocin production greatly facilitates the construction of newer strains capable of producing elevated levels of this food grade preservative. Molecular cloning and manipulation of genes adopted during bacteriocin production may further improve the preservative and therapeutic value of fermented foods. GS

Cheese

1292

Singh (S) and Kanawjia (SK). **Application of biotechnology in accelerated ripening of cheese.** *Indian Dairyman* 45(2); 1993; 66-67

Application of biotechnological principles enhanced the ripening buffalo cheddar cheese. DRI-VAC cultures No. 40, 44 and 56 developed better flavour. *Lactobacillus casei* starter increased flavour. Adding cheddar curd slurries to milk accelerated flavour development. Use of microbial rennet in buffalo milk accelerated the cheese ripening. Exogenous enzymes like proteases and lipases, stimulated flavour development and enhanced glycolysis, proteolysis and lipolysis during cheese

ripening. Microencapsulated enzymes stimulated flavour development. Supplementation of buffalo milk with goat milk accelerated cheese ripening. GS

1293

Thapa (TB) and Gupta (VK). **Changes in sensoric and rheological characteristics during storage of processed cheese foods prepared with added whey protein concentrates.** *Indian Journal of Dairy Science* 45(3); 1992; 140-145

Processed cheese foods (PCF) manufactured with whey protein concentrates (WPC) at 0%, 15% and 20% levels showed faster (p) deterioratin of flavour and appearance during storage 37°C. A shelf-life of 42 days was observed in processed cheese foods, having 20% of cheese solids replaced with those of WPC. NDRI and exp. processed cheeses exhibited signficantly longer ($p < 0.05$) shelf-life (77 and 78 days respectively). During storage, hardness increased, cohesiveness and springiness decreased, and adhesiveness, gumminess and chewiness showed varying trends in those products. BV

Cream

1294

Lee (S-Y) and Morr (CV). **Fixation staining methods for examining microstructure in whipped cream by electron microscopy.** *Journal of Food Science* 58(1); 1993; 124-127

Whipped dairy cream (WDC) specimens were prepared for examination by transmission electron microscopy (TEM) and scanning electron microscopy (SEM) by one of 3 alternative post-mordant procedures, i.e., imidazole-buffered osmium tetroxide (IBO), ferricyanide osmium tetroxide and tricomplex osmium tetroxide. These procedures utilized a tannic acid-guanidine-HCl mordant, thiocarbohydrazide as a bridging ligand, and a p-phenylenediamine en bloc stain treatment to improve specimen fixation and staining. TEM and SEM specimens prepared by all three procedures provided good contrast and resolution of the microstructure of WDC. The IBO method provided more uniform staining and more complete fixation and retention of lipids in milk fat globules than either of the other two methods. AA

Dahi

1295

Sarkar (SP), Dave (JM) and Sannabhadti (SS). **A note on the effect of thermization of *misti dahi* on the acid producers count.** *Indian Journal of Dairy Science* 45(3); 1992; 131-134

Thermization was introduced as the last processing step on the finished product for enhancing the shelf-life. The average per cent reduction in the cfu of the acid producers observed after thermization at 60°C for 5 min of buffalo milk *misti dahi* was 99.98, 99.41, 99.49 and 99.99 for MDC-1, MDC-2, MDC-3, MDC-4, and MDC-5, and for cow milk *misti dahi* the reduction values were observed to be 99.76, 99.37, 99.47, 99.52, and 99.59, respectively. It is seen that the reduction in acid producers count for both the type of *misti dahi* with thermization varied with the types of cultures. AA

1296

Sarkar (SP), Dave (JM) and Sannabhadti (SS). **Effect of thermization of *misti dahi* on shelf-life and β-D-glactosidase activity.** *Indian Journal of Dairy Science* 45(3); 1992; 135-139

The results indicate that though the thermization treatment has adverse influence on enzyme activity and associated nutritional benefit. The significant extension in shelf-life that could be achieved by this treatment may make it an attractive proposition for the dairy indusltry. *Misti dahi* based on cow and buffalo's milk, using commercial mixed starter (MDC-1) and *Streptococcus thermophilus* strains (MDC-2 and MDC-3) subjected to thermization at 60°C for 10 min produced an acceptable product with a shelf-life of 3 wks at ambient temp. (28-32°C). SRA

Ghee

1297

Arora (KL), Gupta (VK) and Chakraborty (BK). **Sensory qualities of curdled milk ghee vis-a-vis commercial ghee.** *Indian Journal of Dairy Science* 45(3); 1992; 157-158

Curdled milk ghee was comparable in all sensory characteristics to the commercial ghee. Curdled milk ghee showed significantly (p less than or equal to 0.05) more appealing flavour (score: 55.0-56.13) than fresh milk ghee (score: 52.83). The texture of curdled milk ghee was comparable with that of fresh and 0.5% T.A. milk ghee, but was significantly (p less than or equal to 0.05) inferior (score: 21.67-21.83) to that of NDRI ghee (score: 23.17). Results suggest that sour curdled milk can be effectively utilized for ghee manufacture through direct churning method with the view of optimum fast recovery, physico-chemcial and sensory characteristics, shelf-life and safety aspects. SRA

Ice creams

1298

Kishi (M), Ugajin (I), Masuda (Y) and Uzawa (M). **Free amino acids of commercial vanilla ice creams and their materials.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(9); 1991; 811-816

Free amino acids (FAA) of commercial vanilla ice creams and their materials, dairy products and egg yolk, were determined by an amino acid analyzer. (1) The total FAA content of 11 samples of vanilla ice creams was from 94 to 388 μg/g. Among FAA of ice creams, the major components were glutamic acid, taurine and phosphoethanolamine. (2) The ice creams were classified based on a price per volume into four groups; super premium type ice cream (SPI), premium type ice cream (PI), normal type ice cream (NI) and rakuto-aisu (RA) in order of price. The averages of total FAA of SPI, PI, NI and RA were 297, 191, 147 and 96 μg/g. The difference in the composition of FAA between SPI and the other groups seemed to be caused by the use of egg yolk. (3) The total FAA contents of fresh cream, butter, evaporated skim milk, skim milk powder and egg yolk were 65, 42, 470, 1196 and 4697 μg/g. The heat treatments on fresh cream, evaporated skim milk and skim milk powder during the process of of manufacture were different, but their total FAA contents in micrograms per gram of non-fat milk solid were nearly the same. And also, their compositions of FAA were nearly the same. The compositions of FAA of ice creams except SPI were similar to those of dairy products. AA

Khoa

1299

Goyal (GK). **Changes in the oxygen transmission rate of flexible packages during storage of khoa.** *Indian Journal of Dairy Science* 45(3); 1992; 127-130

Milk proteins

1300

Yost (RA) and Kinsella (JE). **Properties of acidic whey protein gels containing emulsified butterfat.** *Journal of Food Science* 58(1); 1993; 158-163

Changes in physical properties of whey protein gels following, addition of emulsified fat were investigated. Gels were made by heating mixtures of dialysed whey protein isolate (DWPI) at pH 4.60 with and without emulsified fat droplets. At higher DWPI concn. (10.50%) and fat concn. (0.00-30.00%) gels were very firm. A mean fat droplet size of 1.85 μm reinforced gel strength. Gels of 6.78% DWPI were the most responsive to reinforcement by emulsified butter fat. The elastic moduli and viscosities of whey protein gels at pH 4.60 increased with fat content, whereas syneresis decreased upon addition of fat. SRA

1301

Mahmoud (R) and Savello (PA). **Mechanical properties of and water vapour transferability through whey protein films.** *Journal of Dairy Science* 75(4); 1992; 942-946

Transglutaminase was used to produce films by polymerization of whey proteins. The reaction mixture consisted of 5% whey protein in pH 7.5 buffered solution under reducing conditions in the presence of Ca^{2+} ions and glycerol. The water vapour transferability and the percentage of moisture of films were not significantly influenced by the whey protein fraction. Water vapour transferability was inversely related to film thickness. Glycerol concn. of films directly affected film resistance to breakage, moisture content, and resistance to water vapour transferability. AA

1302

Mistry (VV) and Hassan (HN). **Manufacture of nonfat yoghurt from a high milk protein powder.** *Journal of Dairy Science* 75(4); 1992; 947-957

Nonfat yoghurts were manufactured from skim milk fortified with a new high milk protein powder. The powder, containing approx. 84% milk protein, was added to skim milk to obtain 5.2 to 11.3% total protein, 11.1 to 15% total solids, and 1.6 to 7.9% lactose in the yoghurt mix. Mixes were homogenized, pasteurized at 90°C for 10 min, and fermented with a yoghurt culture at 42°C to pH 4.6. Controls were made from the same skim milk fortified with NDM to approx. 14% total solids. Yoghurts made with the protein powder and containing 5.6% protein were similar in firmness to the control and had good flavour when fresh and after 2 wk of storage. Yoghurts with more than 5.6% protein were too firm and had an astringent flavor. Acetaldehyde content of all yoghurts was comparable with that of the control, and fat content ranged from .18 to .33%. As the protein content of yoghurts increased, the porosity of yoghurts, as seen by scanning electron microscopy, decreased. Good quality nonfat yoghurts can be produced supplementing skim milk with a high milk protein powder up to 5.6% protein. The added protein assists in providing a firm body and minimal whey separation without the use of stabilizers. AA

Meat

1303

Petersen (A). **N-Nitrosodibutylamine and other volatile nitrosamines in cured meat packaged in rubber nettings.** *Journal of Food Science* 58(1); 1993; 47-48

Results of the two investigations (conducted at Denmark, USA and Canada) of N-nitrosodibutylamine (NDBA) in cured meat are compared. At Denmark small amounts of NDBA were found in the cured meat packaged in elastic rubber nettings. This was very unlike the results from investigations in the USA and Canada. Cured meats packaged in plastic wrappings or cotton nettings did not contain any NDBA. SRA

1304

Miyazawa (T), Kashima (M) and Fujimoto (K). **Fluorometric peroxygenase assay for lipid hydroperoxides in meats and fish.** *Journal of Food Science* 58(1); 1993; 66-70

A fluorometric assay for lipid hydroperoxide in meats and fish was developed using pea peroxygenase, a hydroperoxide-dependent hydroxylase. The freeze-dried microsome fraction of germinating pea seed was used as a peroxygenase source. Linear relationships between the hydroperoxide added (25 to 150 nmol) and fluorescence were observed with methyl linoleate hydroperoxide, linoleic acid hydroperoxide, triglyceride hydroperoxide, and phosphatidylcholine hydroperoxide. α-Tocopherol at levels equivalent to those in meats and fish did not affect the peroxygenase reaction. The assay was specific for hydroperoxides. The method enables detn. of total lipid hydroperoxides in sample homogenates without extracting total lipids from retail meats and fish. AA

Beef

1305

Ellekjaer (MR). **Assessment of maximum cooking temperatures of previously heat treated beef. Part 2. Different scanning calorimetry.** *Journal of the Science of Food and Agriculture* 60(2); 1992; 255-261

Differential scanning calorimetry (DSC) was studied as a potential method for the detn. of the previous heat treatment of beef. Samples of beef (*M. longissimus dorsi*) from eight bulls were heat treated at nine different temp. between 50 and 85°C and subsequently analysed by DSC. The DSC method was able to determine the previous heat treatment temp. of the beef samples with a prediction error of 0.6°C in the temp. range 50-72°C, when multivariate analysis of the full DSC-thermograms was used. This indicates that DSC has potential applicability as a regulatory method to assess the max. cooking temp. of previously heat treated beef. AA

1306

Chan (KM), Decker (EA) and Means (WJ). **Extraction and activity of carnosine, a naturally occurring antioxidant in beef muscle.** *Journal of Food Science* 58(1); 1993; 1-4

Several methods were tested to produce a carnosine-containing antioxidant extract from beef muscle (BM). Removal of prooxidants (iron- and heme-) containing compounds by 100°C heat treatment or ultrafiltration increased antioxidant activity (AA) of BM extract. Freeze-drying had little effect on the AA of treated extracts, but vacuum oven drying increased the AA. Demineralized vacuum oven-dried 100°C heated extract had the greatest AA at low carnosine concn. However, > 85% inhibition of lipid oxidation was obtained with freeze-dried (30 mM) and vacuum oven-dried (> mM) UF permeate and vacuum oven-dried 100°C heated extract (> 10 mM). SRA

1307

Cooksey (K), Klein (BP) and McKeith (FK). **Heating and texture profiles of packaged pasteurized beef loin steaks from precooked roasts.** *Journal of Food Science* 58(1); 1993; 5-8, 20

Heating and cooling profiles for precooked beef loin steaks to 60, 70 and 80°C internal end point temp. When pasteurized in a water bath set at 65, 85, and 100°C was determined and the effect of the end point temp. and pasteurization water temp. on the physical and textural characteristics of the meat were examined. Steaks heated to internal temp. close to the cooking water temp. had the least differences in temp. between layers. Total cooking losses increased ($p < 0.05$) as internal end point temp. and pasteurization water temp. increased. Texture profiles of steaks cut from precooked roasts were similar to pasteurized steaks. SRA

1308

Park (J), Rhee (KS), Kim (BK) and Rhee (KC). **Single-screw extrusion of defatted soy flour, corn starch and raw beef blends.** *Journal of Food Science* 58(1); 1993; 9-20

Effects of feed moisture, fat and corn starch levels and process temp. on physical properties of extrudates of defatted soy flour-amylose corn starch-raw beef blends were investigated using response surface methodology. Feed moisture (X1) linearly affected shear-force (SF), water absorption (WA), and quadratically affected expansion ratio (ER), bulk density (BD) and SF; feed fat (X2) had a linear effect on ER and BD; corn starch (X3) had a linear relationship with ER, BD and SF and a quadratic relationship with BD and SF; process temp. (X4) had a linear effect on BD, hunter colour (HCL) and WA and a quadratic effect on ER and SF; the two-factor interactions found to be significant were X2, X3 for HC(L) and WA and X1, X4 for HC(L). The optimum extrusion conditions for minimal SF values with 20% non-dehydrated beef muscle and varied amounts of defatted soy flour, were 29.1% feed moisture; 2.96% feed fat; 22% feed corn starch; and 162°C process temp. SRA

1309

Park (J), Rhee (KS), Kim (BK) and Rhee (KC). **High-protein texturized products of defatted soy flour, corn starch and beef: Shelf-life, physical and sensory properties.** *Journal of Food Science* 58(1); 1993; 21-27

Selected mixes consisting of Bf [high-beef (29%), low-fat (2.96%)], bf [low-beef (20%) low-fat] and BF [high-beef high-fat (5%)] which incorporated raw beef, defatted soy flour, and corn starch were extruded in a single-screw extruder. The products had no flavour additives and trained sensory panelists detected hay-like, beany or grainy flavours. Bf extrudate was more expanded than BF extrudate and rated least hard by the sensory panel, whereas bf extrudate was least susceptible to lipid oxidation. Bf and bf extrudates showed microstructures with large air cells. All three showed advantages of beef and soy flour in amino acid and fatty acid compositions, respectively, and were microbiologically safe during prolonged storage at 37°C. AA

1310

Arnold (RN), Scheller (KK), Arp (SC), Williams (SN) and Schaefer (DM). **Dietary α-tocopheryl acetate enhances beef quality in Holstein and beef breed steers.** *Journal of Food Science* 58(1); 1993; 28-33

1311

Berry (BW). **Fat level and freezing temperature affect sensory, shear, cooking and compositional properties of ground beef patties.** *Journal of Food Science* 58(1); 1993; 34-37, 42

The effects of two fat levels (6, 20%) and two freezing temp. (-43, -20°C) on sensory, shear, cooking and compositional properties of beef patties were studied. The 20% fat formulation increased beef flavour and initial tenderness (-20°C frozen patties) scores, but had higher shear values compared to 6% beef fat patties. Patties with 6% fat, freezing at -43°C improved sensory and tenderness. Faster freezing reduced fat retention of 20% fat patties during cooking. Use of select grade round muscles in combination with a 5-6 min cooking to a medium degree of doneness permitted an acceptable level of palatability. SRA

1312

Dickson (JS). **Contamination of beef tissue surfaces by artificially inoculated low-moisture menstrua.** *Journal of Food Safety* 12(3); 1992; 181-190

Salmonella typhimurium was inoculated into prepared dirt (moisture content 8.8%), sand (moisture content 0.06%) and phosphate buffer, and these menstrua were used to contaminate beef tissue. Fewer bacteria adhered to the tissue surface from the low moisture menstrua when compared to contamination by buffer. Detn. of S_R values, an estimate of the total population associated with the surface which was physically attached, indicated that more bacteria remained in the soil menstruum than adhered to the surface, when compared to buffer and sand menstrua. Contrary to expectations, bacteria which contaminated the surface from the low moisture menstrua were not more sensitive to organic acids than those which originated from the buffer. AA

1313

Anderson (ME), Marshall (RT) and Dickson (JS). **Estimating depths of bacterial penetration into post-rigor carcass tissue during washing.** *Journal of Food Safety* 12(3); 1992; 191-198

A method for predicting the depth of penetration of bacteria into various beef tissues was developed. Blue Lake, an insoluble dye, was used to simulate bacteria on the meat surface because movement of the Blue Lake into the meat tissue during spray washing could be easily visualized. The beef tissue surfaces studied were: (1) exterior lean, (2) exterior fat, (3) interior body cavity (peritoneium) and (4) cut tissue. The model indicated that many bacteria not removed during washing are driven into the beef tissue by the washing process. Interior body cavity tissue was most resistant to penetration followe soy exterior lean and fat tissues, which were about equal in resistance. Cut surfaces were the most susceptible to Blue Lake penetration. AA

1314
Bonnet (M), Ouali (A) and Kopp (J). **Beef muscle osmotic pressure as assessed by differential scanning calorimetry (DSC).** *International Journal of Food Science and Technology* 27(4); 1992; 399-408

A differential scanning calorimetry (DSC) method was developed to estimate the physiological osmotic pressure of intact bovine muscle and post-mortem variation during the conversion of muscle into meat DSC method was more practical and reliable than the freezing point osmometric method and the soaking method. GS

Pork

1315
Ghorpade (VM) and Cornforth (DP). **Spectra of pigments responsible for pink colour in pork roasts cooked to 65 or 82°C.** *Journal of Food Science* 58(1); 1993; 51-52, 89

Undenatured oxymyoglobin and deoxymyoglobin were the pigments responsible for pink colour in pork roasts cooked to 65°C. Roasts cooked to 82°C had gray internal colour after cooking, but panelists noted development of pink internal colour after refrigerated storage. Reflectance spectra of pink slices from roasts cooked to 82°C, then stored for 12 days at 2°C, were characteristic of denatured globin hemochromes or related non-nitrosyl hemochromes. AA

1316
Garcia Zepeda (CM), Kastner (CL), Kropf (DH), Hunt (MC), Kenney (PB), Schwenke (JR), Schleusener (DS). **Utilization of surimi-like products from pork with sex-odour in restructured, precooked pork roast.** *Journal of Food Science* 58(1); 1993; 53-58, 83

Surimi-like materials from boar and sow muscle and Alaskan pollack fish surimi were evaluated as binders for sow muscle chunks in restructured roasts. Boar surimi-like material tended to have lower microbial counts and less lipid oxidation than unwashed counterparts. Increasing salt content increased lipid oxidation ($P < 0.05$), degraded colour and improved ($P < 0.05$) textural integrity. The surimi-like boar material had equal or better binding properties than fish surimi at a 5% level and did not consistently result in detectable boar odour. Roasts without binder were comparable or better in textural and microbial characteristics than those with binders. Restructured, precooked, pork roasts were successfully produced with 0.2% NaCl. AA

1317
Scholtz (E), Kruger (J), Nortje (G) and Naude (R). **Centralized bulk pre-packaging of pork retail cuts.** *International Journal of Food Science and Technology* 27(4); 1992; 391-398

The performance of a commercial bulk pre-packaging system was compared to a laboratory system in terms of quality attributes such as microbiology, colour, odour, and acceptability of PVC-overwrapped pork retail cuts. A similar retail shelf-life of 3 days was acheived after either 0, 7, or 14 days bulk storage with both packaging systems. The colour of the samples from both system was pale to normal during the trial. After 14 days storage the samples from both systems were still acceptable and had a fresh meat odour. The results show that the commercial system (Cryovac GFII, Darex Africa (Pty) Ltd., Kemptonpark RSA) may be applied successfully for 100% CO_2 bulk packaging of PVC-overwrapped pork retail cuts. AA

Rabbits

1318
Sundaram (RNS) and Bhattacharyya (AR). **Performance of exotic meat rabbit under tropical coastal climatic condition.** *Indian Journal of Animal Research* 26(2); 1992; 109-110

Out of 4 meat type exotic breeds (Soviet Chinchilla, New Zealand White, Grey Giant and White Giant) of rabbit introduced under the coastal climatic condition (Goa), production performance of Soviet Chinchilla was better with highest kindling (78.5%), litter size (6) and av. daily wt. gain (19.17 g). The result is indicative that the meat type rabbits, particularly, Soviet Chinchilla can be successfully reared for quality meat production. AA

Products

1319
Singh (H), Guerrero (A) and Kremers (W). **Nonane as a radiolytic product in irradiated bacon.** *Journal of Food Science* 58(1); 1993; 49-50

Formation of nonane in irradiated bacon has been confirmed by GC/MS analysis of irradiated nitrogen-flushed homogenized bacon in sealed glass vials. Unirradiated bacon did not show the presence of nonane under similar conditions. AA

1320
Kondyli (E), Demertzis (PG) and Kontominas (MG). **Migration of dioctylphthalate and dioctyladipate plasticizers from food-grade PVC films into**

ground-meat products. *Food Chemistry* 45(3); 1992; 163-168

Ground-meat of varying fat contents at 4°C and -20°C was studied for the presence of dioctylphthalate (DoP) and dioctyladipate (DoA) plasticizer migrated from PVC films. After the extraction and saponification, the alcoholic constituent of the ester plasticizer was quantified by GC. The migrated amount ranged from 2-80 mg/kg of meat (0.12-4.8 mg/dm^2) after 8 days at 4°C and from 2-60 mg (0.13-4 mg/dm^2) after 2 1/2 months at -20°C. The amount of migrating DoA was higher than the DoP and the migration was lower to low fat samples. The rate determining step in the migration process of both DoA and DoP is that of the diffusion of the plasticizer from the bulk of the PVC film to its surface. SD

1321

Aranda (M), Trivino (I), Osorio (A), Bastias (JM) and Roos (O). **Mutagenicity of N-nitroso compounds in Chilean ham and sausages.** *International Journal of Food Science and Technology* 27(4); 1992; 385-390

Chilean hams and sausages were analysed for the presence of nitrosodimethylamine and nitrosodiethylamine by GLC/NPD. The presence of 3.5-210 p.p.b levels were found in 51.6% of the samples. All of the positive samples contained nitrosodimethylamine while only 11% of them contained nitrosodiethylamine. Mutagenicity assays were performed in *Salmonella typhimurium*. Strains TA 98 and TA 100 were used in absence and presence of S9 mix. A dose-response curve of the mutagenic activity was observed in TA 100 with S9 mix. Unscheduled DNA synthesis assay also confirmed that the purified extracts of hams and sausages at doses as low as 1 p.p.b are inducers of damage to DNA of human foetal lung cells. AA

Frankfurters

1322

Martin (JW) and Rogers (RW). **Cure levels, processing methods and meat source effects on low-fat frankfurters.** *Journal of Food Science* 58(1); 1993; 59-61

1323

Fiddler (W), Pensabene (JW), Gates (RA), Hale (M), Jahncke (M), Babbitt (JK). **Alaska Pollock (*Theragra chalcogramma*) mince and surimi as partial meat substitutes in frankfurters: N-Nitrosodimethylamine formation.** *Journal of Food Science* 58(1); 1993; 62-65, 70

Poultry

1324

Sachdev (AK), Verma (SS) and Ram Gopal. **Scope of biotechnology in poultry processing.** *Poultry Guide* 30(3); 1993; 50-51

Emphasizes the need to standardize cost and time effective technology to produce biosecured meat and to make effective use of poultry byproducts; suggests methods for extraction of proteins from livestock wastes; and reviews biotechniques in extending the shelf-life of meat and processing of poultry slaughter wastes for animal feeds. 17 references. GS

1325

Kondaiah (N) and Panda (B). **Processing and utilization of spent hens.** *World's Poultry Science Journal* 48(3); 1992; 255-268

Review covers information on various aspects of spent hen processing and utilization. Aspects considered include: handling, transportation and slaughter, yields of carcass components, hot processing, mechanically debonned meat, tenderization methods, physicochemical characteristics, utilization (chicken sausages and patties). BV

Chickens

1326

Xiong (YL) and Blanchard (SP). **Viscoelastic properties of myofibrillar protein-polysaccharide composite gels.** *Journal of Food Science* 58(1); 1993; 164-167

The effect of polysaccharide gums on thermal gelation of chicken salt-soluble protein (SSP) was studied by determining changes in viscoelasticity. In a typical ionic environment for meat processing (0.6 M NaCl, pH 6.0), xanthan gum and sodium alginate at the 0.5% level improved WHC of SSP gel but hindered SSP gel structure formation and decreased gel strength. Gums at > 0.5% markedly reduced gelling ability of SSP and did not further increase water binding. Therefore, neither xanthan gum nor sodium alginate at > 0.5% is recommended for use as a texture modifier in processed meat production. SRA

1327

Dodd (NJF), Haishun (J), Lea (JS) and Swallow (AJ). **Factors influencing the yield of free radicals in irradiated chicken bones.** *International Journal of Food Science and Technology* 27(4); 1992; 371-383

The yield of free radicals in irradiated chickenbones was influenced by the nature of the bone, temp. of irradiation and gaseous atm. The dose rate, water content and type of radiation did not influence the yield of radicals. Cooking before irradiation increases the yield of radicals, whereas cooking after irradiation does not cause any change. GS

Broilers

1328

Bajwa (IS), Singh (B), Dhir (DS) and Trehan (PK). **Effect of plumage colour on body-weight, abdominal fat and other carcass characters in broilers.** *Indian Journal of Animal Research* 26(2); 1992; 61-66

The effect of plumage colours on 6 wk. live-wt. and dressed carcass characters of broilers were studied on two populations PB-1, a growth selected line and PB-4, a random bred control. Plumage colour had significant effect on live wt. at 6 wk. Birds with various plumage colour did not differ significantly for dressed carcass yield, wt. of giblets and abdominal fat contents when expressed as % of live wt. The proportional abdominal fat content was significantly higher in growth selected line PB-1. Female birds of both the populations had higher abdominal fat than their male counterparts ($P < 0.05$). AA

1329

Ajuyah (AO), Ahn (DU), Hardin (RT) and Sim (JS). **Dietary antioxidants and storage affect chemical characteristics of** ω-3-fatty acid enriched broiler chicken meats. *Journal of Food Science* 58(1); 1993; 43-46,61

The influence of feeding full-fat flax seed with and without dietary antioxidants to 6-wk old male Hubbard chickens, on chemical characteristics of cooked white and dark meats was assessed. Level of dietary ω-3 fatty acid and dietary antioxidant significantly influenced the ω-3 PUFA compositions of meat lipids. Addition of antioxidants, especially mixed tocopherol plus canthaxanthin, to the diet significantly reduced concn. of malonaldehyde and total volatiles in the enriched meat, particularly dark meat. Broiler meats enriched with ω-3 fatty acids could be stabilized by incorporation of natural antioxidants. AA

Products

Eggs

1330

Hsieh (YL), Regenstein (JM) and Anandha Rao (M). **Gel point of whey and egg proteins using dynamic rheological data.** *Journal of Food Science* 58(1); 1993; 116-119

The gel point temp. of coagulation type proteins and gelation type proteins were determined by extrapolating the rapidly rising phase of the storage modulus G' back to the temp. axis. The gelation onset temp. of the concen.dependent proteins ovalbumin, ovotransferrin, and BSA were 81°C, 62°C, and 75°C, respectively. Gelation of whey protein isolate and egg white gels, both concn.-dependent, was presumably due to disulphide bonds formed by the interactions of the concn.-independent proteins; α-lactalbumin and β-lactoglobulin, and ovalbumin and ovotransferrin, respectively. Moreover, the incipient gel temp. of whey proteins decreased when the concn. of whey proteins increased. AA

Egg powder

1331

Lebovics (VK) and Gaal (O). **Cholesterol oxides in γ-irradiated spray-dried egg powder.** *Journal of the Science of Food and Agriculture* 60(2); 1992; 251-254

Thin-layer chromatography was used to follow up the chemical changes of cholesterol in spray-dried egg powder γ-irradiated under aerobic conditions with doses intended to eliminate *Salmonella* contamination. Chemical changes induced in cholesterol in egg powder ionising radiation proved to be similar in nature to those known to occur during autoxidation. Formation of 7-hydroxy-cholesterol isomers (α and β) could be observed even at 1 and 2 kGy. Doses of 4 and 6 kGy increased the quantity of these products and resulted in the appearance of cholesterol-5, 6-epoxide. At 6 kGy 7-keto-cholesterol was also identified. Non-irradiated egg powder stored for 1 month contained approx. the same quantity of 7-hydroxycholesterols as a freshly produced egg powder irradiated at 1 kGy; freshly produced egg powder irradiated at 6 kGy corresponded to 3-month-old egg powder. AA

Egg white

1332

Hsieh (YL) and Regenstein (JM). **Failure deformation and stress relaxation of heated egg white gels.** *Journal of Food Science* 58(1); 1993; 113-115, 123

Stress-strain relationships were determined for heated egg white gels. Compressive strain at failure

was independent of protein concn., while stress at failure increased with protein concn. Between the length ratios of 1.6 and 2.4 before and after compression, the heated egg white gels followed the Mooney Rivlin model. In stress relaxation, the asymptotic hypothetical equilibrium modulus increased with protein concn. AA

SEAFOODS

1333

Joy (CPH). **An economic and efficient method for treatment of effluent water from seafood processing plants.** *Seafood Export Journal* 25(1); 1993; 50-52

This article covers nature of effluents from seafood processing plants, effluent water parameters (biochemical oxygen demand, suspended solids, oil and grease), treatment of effluents (total utilization; separation, physical-chemical treatment; chemical oxidation; air floatation; biological treatment; activated sludge treatment; high-rate trickling filter; ponds and lagoons and land disposal methods) and details of tangential screen model (character of effluent water, method of discharge of residue). BV

Crabs

1334

Lee (E), Meyers (SP) and Godber (JS). **Minced meat crabcake from blue crab processing by-products - Development and sensory evaluation.** *Journal of Food Science* 58(1); 1993; 99-103

Shrimps

1335

Kantt (CA), Bouzas (J), Dondero (M) and Torres (JA). **Glucose oxidase/catalase solution for on-board control of shrimp microbial spoilage: Model studies.** *Journal of Food Science* 58(1); 1993; 104-107

An enzymatic method for on-board preservation of shrimp was examined in a model system. Holding shrimp in a glucose-GOX/CAT sol. inhibited growth of *Pseudomonas fluorescens* in the sol. and caused a lag phase of approx. 5 days in the shrimp. After 14 days storage, *Ps. fluorescens*, counts had increased < 2 log cycles, while the control increased 4 log cycles. This demonstrated the potential of storing shrimp in a glucose oxidase sol. as a preservation method. Fishing vessels with refrigerated sea water systems could benefit from such longer storage times. SRA

Fish

1336

Reppond (KD) and Babbitt (JK). **Protease inhibitors affect physical properties of arrowtooth flounder and walleye pollock surimi.** *Journal of Food Science* 58(1); 1993; 96-98

The effects of protease inhibitors from potato, bovine plasma and egg white on the punch, torsion and colour tests of arrowtooth floudner and pollock surimi were determined. At 2% addition, the inhibitors increased the strength of arrowtooth gels while variable results were found with pollock gels. Bovine plasma produced a gel with a yellow hue while the gel with potato inhibitor was darkest. AA

1337

Suparno and Poernomo (A). **Fish waste utilisation in Indonesia.** *ASEAN Food Journal* 7(2); 1992; 67-72

This paper outlines some of the studies and present status of fish waste utilisation in Indonesia. Shrimp waste, frog waste, fresh water fish waste, shrimp trawl by-catch or trash fish, fish gut, shark and problems of fish waste utilisation are the aspects included. SRA

Albacore

1338

Medina (I), Aubourg (S), Gallardo (JM) and Perez-Martin (R). **Comparison of six methylation methods for analysis of the fatty acid composition of albacore lipid.** *International Journal of Food Science and Technology* 27(5); 1992; 597-601

Six methods widely used to produce methyl esters for the GC detn. of the fatty acid composition of a marine lipid were compared. Four acid-catalyzed methods (1% H_2SO_4:CH_3OH; 5% HCl:CH_3OH; 7% and 14% BF_3:CH_3CH) and two base-catalyzed methods [0.5 M $NaOCH_3$:CH_3OH;(1:4) tetramethylguanidine:CH_3OH] were used. The use of BF_3:CH_3OH (7% and 14%) gave a lower content of 18:1 n_9 than the other methods and produced an artefact (2.7-3.2% of total fatty acid content) eluting between the 20:5 and 24:1 fatty acid methyl esters. No significant differences were obtained between the other four methods. Accordingly the use of BF_3:CH_3OH for transmethylation of marine lipids is not recommended. Results obtained in the other 4 methods showed that all are comparable. AA

Catfish

1339

Eun (J-B), Hearnsberger (JO) and Kim (JM). **Antioxidants, activators and inhibitors affect the enzymic lipid peroxidation system of catfish muscle microsomes.** *Journal of Food Science* 58(1); 1993; 71-74

Various promoters and inhibitors of enzymic lipid peroxidation in catfish were investigated. At 100 p.p.m. BHA, BHT, nordihydroguaiaretic acid, TBHQ, propyl gallate, EDTA, sodium tripolyphosphate, diethylene triamine pentaacetic acid, trihydroxybutyrophenone, and ethoxyquin completely inhibited lipid peroxidation activity. Natural antioxidants, α-tocopherol, β-carotene, and rosemary powder, had moderate inhibitory effects. Sodium ascorbate and erythorbate at a concn. of 100 p.p.m. activated lipid peroxidation; however, higher concn. of these antioxidants had inhibitory effects. Unlike ferric and ferrous ions, Cu++ ions at 0.015 mM did not catalyze lipid peroxidation. Inorganic pyrophosphate and phosphate at 0.1 mM chelated ferric ion and inhibited lipid peroxidation. AA

1340

Thed (ST), Erickson (MC) and Shewfelt (RL). **Ascorbate absorption by live channel catfish as a function of ascorbate concentration, pH and duration of exposure.** *Journal of Food Science* 58(1); 1993; 75-78

1341

Erickson (MC). **Lipid extraction from channel catfish muscle: Comparison of solvent systems.** *Journal of Food Science* 58(1); 1993; 84-89

During extraction of lipids from catfish minced muscle using 9 solvent systems phospholipid and triacylglycerol recoveries were similar when tissue was mixed on a vortex (under nitrogen) with about 20 vol of chloroform:methanoll (2:1), hexane:isopropanol (3:2), chloroform:isopropanol (7:11), dichloromethane:methanol (2:1) or chloroform:methanol:water (2:2:1). Only a few min were required to extract a tissue sample by these methods as compared to a few h for a Soxhlet extraction (petroleum ether)or for extraction by a dry column procedure (dichloromethane:methanol, 9:1). The time available for interaction of the muscle tissue with the dichloromethane:methanol (9:1) system was critical in extraction of lipids, particularly phospholipids. AA

Hake

1342

Mendez (E), Fernandez (M), Pazo (G) and Grompone (MA). **Hake roe lipids.** *Food Chemistry* 45(3); 1992; 179-181

Raw Southwest Atlantic hake (*Merluccius hubbsi*) roe was high in lipid (6.6% dry wt. basis), and the major lipids were waxes 27.6% triacylglycerols 42.0%, cholesterol 5.7% and phospholipids 14.0%. Cooking roes in water did not change them significantly. The free fatty acid composition was 45% of polyunsaturated fatty acids (PUFA) and characteristics of manne oils. Hake roes constitute a rich source of PUFA, and therefore a valid alternative for normal diets. SD

Mackerels

1343

Hwang (KT) and Regenstein (JM). **Characteristics of mackerel mince lipid hydrolyisis.** *Journal of Food Science* 58(1); 1993; 79-83

The lipid hydrolysis products in minced mackerel stored under vacuum at 2-3°C for 15 days were free fatty acids (FFA) and 1,2-diglycerides (DG); no 1,3-DG or monoglycerides were observed. Lysophosphatidylcholine (LPC and lysophosphatidylethanolamine (LPE) increased and then decreased with time. Lysophosphatidylserine was not observed. More FFA, 1,2-DG, LPC, and LPE were detected in dark muscle than in light muscle. The initial fatty acid composition, by GC, showed no significant differences (α-0.05) among whole, light and dark muscles. When the lipid extracts were separated into 3 fractions (1: mostly triglycerides; 2: mostly FFA, DG, and cholesterol; and 3: mostly phospholipid), the degree of unsaturation of the lipids in fraction 2 was between those in fraction 1 and 3 and increased with time. These findings support the possibility that fish lipid hydrolysis may affect fish wholesomeness. AA

Salmon

1344

Porter (PJ), Kramer (DE) and Kennish (JM). **Lipid composition of light and dark flesh from sockeye salmon.** *International Journal of Food Science and Technology* 27(4); 1992; 365-369

The dark flesh of sockeye salmon (*Oncorhynchus nerka*) contains over 8 times more lipid than does light flesh, and has a greater proportion of triglycerides and monounsaturated fatty acids. The predominant phospholipid in the light flesh is phosphatidylcholine and in dark flesh it is phosphatidylethanolamine. Both light and dark

flesh are rich sources of the nutritionally important ω-3 fatty acids. BV

Smooth oreo dory

1345
Scott (DN), Fletcher (GC), Charles (JC) and Wong (RJ). **Spoilage changes in the deep water fish, smooth oreo dory during storage in ice.** *International Journal of Food Science and Technology* 27(5); 1992; 577-587

Smooth oreo dory (Pseudocyttus maculatus), a deep water fish, was monitored for changes during storage in ice. Based on the sensory evaluation of the cooked flesh the storage life was 8 days for acceptable quality fish. Bacterial counts of flesh and surface, the loss of inosine monophosphate (IMP) and the K value showed significant changes during the storage life. Therefore these were found to be useful for monitoring loss of freshness and development of spoilage. After 13 days there were off flavours in the cooked fish, dephosphorylation of IMP had levelled off, and the K value had reached 70%. The changes that occurred during storage of this deep water species in ice were similar to those changes commonly observed in demersal species from shallow temperate coastal waters. AA

Snapper

1346
Prescott (J) and Bell (JD). **Sensory evaluation of Australian snapper (*Pagrus auratus*) raised in captivity.** *ASEAN Food Journal* 7(2); 1992; 111-113

This paper reports the sensory evaluation of 3 groups of snapper: wild fish, snapper fed on a pelleted diet based on fish meal, and those raised on fish flesh. The mean rating for flavour, colour of fish and fresh taste exceeded 50 for each type of fish, whereas the rating for presence of off flavour was low for all three types of fish. The rating for flavour was -F2,58 = 2.94, P = 0.061, colour of flesh - F2,58 = 2.89, P = 0.064, fresh taste -F2,58 = 1.78, P = 0.178 and off flavours - F2,58 = 2.45, P = 0.095. The mean rating for oiliness of the flesh varied from 39 to 48, but did not differ significantly among 3 groups of fish (F2,58 = 2.9, P = 0.063). The texture of wild snapper was rated as softer than either of the two groups of captive snapper (F2,58 = 5.4, P = 0.007, 5% LSD = 8.42). There was a significant difference in the overall acceptability of 3 groups of fish (F2,58 = 3.51, P = 0.036). SRA

White amur

1347
Bakir (HM), Melton (SL) and Wilson (JL). **Fatty acid composition, lipids and sensory characteristics of white Amur (*Ctenopharyngodon idella*) fed different diets.** *Journal of Food Science* 58(1); 1993; 90-95

White amur were fed either alfalfa pellets (P) or trout chow (A) for 6 months in laboratory tanks. Compared with fish fed A, fish fed P gained less wt. and had less total lipids (0.73 vs 2.28%). Fish fed P also had higher levels of saturated (SAT), ω-3 (PUFA-3), and ω-6 (PUFA-6) but lower monounsaturated (MONO) fatty acids (FA) in the neutral lipids and lower SAT, MONO, and PUFA-3 but higher PUFA-6 FA in the phospholipids. Frozen, white amur fed P had flavour and acceptability comparable to unfrozen catfish, but those fed A tended to have less desirable flavour. White amur could be a highly acceptable low fat food fish if fed the correct diet. AA

Products

Keropok

1348
Yu (SY) and Low (SL). **Utilization of pre-gelatinized tapioca starch in the manufacture of a snack food, fish cracker ('Keropok').** *International Journal of Food Science and Technology* 27(5); 1992; 593-596

The use of pre-gelatinized tapioca starch for the manufacture of 'keropok' by drum-drying has been investigated. Processing variables were examined by using 5 different slurries of water:starch, with ratios of 50:50, 60:40, 70:30, 80:20, and 90:10 at 4 different temp.: 120.2°C, 133.5°C, 143.6°C, and 151.8°C. Only 'keropok' made from a slurry with a water:starch ratio of 70:30 pre-gelatinized at 133.5°C, 143.6°C and 151.8°C had linear expansion > the min acceptable value of 77%. 'Keropok' containing pre-gelatinized starch produced at 133.5°C was the most acceptable to a sensory panel. AA

Minces

1349
Huidobro (A) and Tejada (M). **Foaming capacity of fish minces during frozen storage.** *Journal of the Science of Food and Agriculture* 60(2); 1992; 263-270

Foaming capacity (FC) of minced muscle of 3 fish species: blue whiting (*Micromesistius poutasson* R), horse mackerel (*Trachurus trachurus* L.) and mackerel (*Scomber scombrus* L.), stored at -18°C, was studied. FC was not diminished by changes in

protein but was affected by the formaldehyde generated during frozen storage. GS

Sauces

1350
Raksakulthai (N) and Haard (NF). **Correlation between the concentration of peptides and amino acids and the flavour of fish sauce.** *ASEAN Food Journal* 7(2); 1992; 86-90

Fermented Capelin (Mallotus villosus) fish sauce (CFS) prepared by mixing salt with fish in a ratio of 1:4 and supplemented with 2.5% (w/w) squid heptopancreas tissue (SHP) was filtered and fractionated using an ultrafiltration unit with MW cut off 10,000. Sensory evaluation scores of CFS prepared with SHP was significantly higher than the control CFS. Both free and total amino acid (AA) contents in SHP-supplemented sauce were also higher (2.25 and 1.79 fold respectively). Regression analysis of sensory evaluation score and free AA content indicated a significant correlation ($r = 0.851$, $p < 0.05$). Removal of the fraction > 10,000 daltons from CFS by ultrafiltration lowered the acceptability score ($P < 0.001$). Major AA residues in peptides were aspartic acid, serineen, glumatic acid and leucine. The typical flavour of CFS was correlated with both free AA and peptides. The acceptable taste of peptides from fish protein hydrolyzate was enhanced by the MW > 1,000 fraction. SRA

PROTEIN FOODS

1351
Mathur (BN). **Bioprocesses for amelioration of protective factors in infant formulas.** *Indian Dairyman* 45(2); 1993; 58-65

Examines the technical feasibility of incorporating factors like immunoglobulins, lactoferrin, lactoperoxidase and lysozyme in the infant formulations to enhance their bioprotective factors. This makes bottle feeding practice safer by providing humoral protection in the gut against enteropathogenic bacteria among infants. GS

1352
Gennadios (A), Weller (CL) and Testin (RF). **Temperature effect on oxygen permeability of edible protein-based films.** *Journal of Food Science* 58(1); 1993; 212-214, 219

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

1353
Rouseff (RL). **Developments in Food Science 25. Bitterness in foods and beverages.** xviii; 1990; + 356

This volume is a comprehensive text devoted to bitterness in foods and beverages. Various chapters covered include: Bitterness in food products: an overview by Rouseff, R.L. (pp. 1-14); Physiological and therapeutical aspects of bitter compounds by Brieskorn, C.H. (pp. 15-34); Compound structure versus bitter taste by Maga, J.A. (pp. 35-48); Biosynthesis of bitter compounds by Robins, J. JR., Rhodes, M.J.C., Parr, A.J. and Watton, N.J. (pp. 49-80); Thermally produced bitter-tasting compounds by Maga, J.A. (pp. 81-102); Bitterness in alcoholic beverages by Chialva, F. and Dada, G. (pp. 103-122); Bitterness and astringency, the pyrocyanidins of fermented apple ciders by Lea, A.G.H. (pp. 123-144); Bitterness/astringency in wine by Noble, A.C. (pp. 145-158); Coffee bitterness by McCamey, D.A., Thorpe, T.M. and McCarthy, J.P. (pp. 169-182); Bitter compounds in dairy products by Schmidt, R. (pp. 183-204); Bitter principles in food plants by Fenwick, G.R. and Others (pp. 205-250); Separation and identification of hop bitter compounds in beer by Cowles, J.M. and others (pp. 251-266); Isolation and identification of bitter compounds in defatted soybean flour by Chang, S.S., Huang, A.S. and Ho, C.T. (pp. 267-274); Bitterness in soy and methods for itstis removal by Marshall, W.E. (pp. 275-292); Biochemistry of lemonoid citrus juice bitter principles and biochemcial debittering processes by Hasegawa, S. and Maier, V.P. (pp. 293-308); Cyclodextrin polymers in the removal of bitter compounds in citrus juices by Shaw, P.E. (pp. 309-324); Removal of bitter compounds from citrus products by absorption techniques by Puri, A. (pp. 325-336). A subject index is also included. CSA

Alcoholic beverages

Beer

1354
Chan (WH), Lee (AWM) and Cai (PX). **Differential-pulse polarographic microdetermination of ethanol and its application to beer analysis.** *Analyst (London)* 117(9); 1992; 1509-1512

Ethanol, after *in situ* derivatization to ethyl dithiocarbonate under phase-transfer catalysis was determined in aqueous solution by differential-pulse polasrography. A supporting electrolyte of NH_4Cl-KH_2PO_4-NaOH containing eosin was found to be essential in this detn. For the

microdetermination of ethanol, this method was proved to be precise, and the detection limit was 0.02% or 0.02 mg (absolute amount of ethanol). The viability of the proposed method for beer analysis has also been established. AA

Wines

1355

Chatonnet (P), Dubourdieu (D), Boidron (J-N) and Pons (M). **The origin of ethylphenols in wines.** *Journal of the Science of Food and Agriculture* 60(2); 1992; 165-178

Ethylphenols are important aromatic compounds of red wines. These compounds are formed in wines by some yeast species belonging to the genus *Brettanomyces/Dekkera* in the presence of hydroxycinnamic acids. These volatile phenols are responsible for the 'phenolic', 'animal' and 'stable' off-odours found in certain red wines. The results presented show that the synthesis of the high quantities of ethylphenols found in the 'phenolic' red wines can occur during the ageing of wines having normally completed their alcoholic and malo-lactic fermentations. This olfactory fault caused by Brettanomyces/Dekkera is found more frequently than the classical 'mousy-taint' attributed to this yeast genus. In addition, the study of the mechanisms of biosynthesis of ethylphenols by Brettanomyces/Dekkera has shown the sequential activities of two enzymes. The first, is a cinnamate decarboxylase (CD), which assures the transformation of certain cinnamic acids into the correspondent vinylphenols; the second is a vinylphenol reductase, which catalyses the reduction of vinylphenols into ethylphenols. The CD activity of *Brettanomyces/Dekkera* is not inhibited by the polyphenolic compounds of red wines (procyanidins and catechins) while these compounds do inbibit the CD activity of *Saccharomyces cerevisiae*. On the other hand, the substrate specificities of the CD activities of *Brettanomyces/Dekkera* and *Saccharomyces* are different. AA

1356

Gloria del Campo and Lajo (MC). **Spectrophotometric determination of biacetyl in distillates of wine by flow injection.** *Analyst (London)* 117(8); 1992; 1343-1346

The reaction of biacetyl with 1-naphthol and creatine in an alkaline medium has been used to develop a flow injection method for the detn. of biacetyl. Acetoin is the principal interferent and, by exploiting the fact that biacetyl reacts comparatively faster than acetoin, the optimum experimental conditions for increasing the selectivity were found. Under these conditions, the relationship between the peak height (absorbance) and the concn. of biacetyl was linear up to a concn. of 10.0 $\mu g\ cm^{-3}$ with a relatve standard deviation (RSD) of 0.74 and 0.37% for 1.0 and 5.0 $\mu g\ cm^{-3}$ biacetyl standards (n = 10), respectively The sampling rate was 30 h^{-1}. When the method was applied to the detn. of biacetyl in wine, after a separation step for biacetyl by steam distillation, the RSD ranged from 2.7 to 3.3% and the results were in good agreement with those obtained by a conventional spectrophotometric method. AA

Non-alcoholic beverages

Coffee

1357

Abdullah (A), Malundo (TMM), Resurreccion (AVA) and Beuchat (LR). **Descriptive sensory profiling for optimizing the formula of a peanut milk-based liquid coffee whitener.** *Journal of Food Science* 58(1); 1993; 120-123

A liquid coffee whitener was formulated using peanut milk as a substitute for sodium caseinate and water. Sensory quality of the formulation was evaluated using a descriptive panel. Six sensory attributes were significantly ($p < 0.05$) affected by the amounts of peanut milk, oil and corn syrup solids in the formulations. The max. amount of peanut milk for an optimum formulation was 40%. The max. fat content increased from 6% to 9% as peanut milk was decreased from 40% to 20%. A concn. of 2-9% corn syrup solids could be used with 20-40% peanut milk. Acceptable formulations within the optimum region contained 6% oil in combination with 40% peanut milk and 2% corn syrup solids or 20% peanut milk and 8% corn syrup solids. AA

Fruit juices

1358

Contreras (NJ), Fairley (P), McClements (DJ) and Povey (MJW). **Analysis of the sugar content of fruit juices and drinks using ultrasonic velocity measurements.** *International Journal of Food Science and Technology* 27(5); 1992; 515-529

The use of ultrasound to determine the sugar content of fruit juices and drinks has been assessed. The velocity of ultrasound and the density were measured in solutions of D-glucose, D-fructose, and sucrose at various concn. (0-40% w/v) and temp. (10-30°C). The velocity of ultrasound was measured in 50:50 wt:wt mixed solutions of sucrose and D-glucose over the same range of concn. and

temp. Measurements of the velocity of ultrasound, the density and the refractive index were made on various fruit juices and drinks at 20°C. The sugar content of the juices and drinks was determined by enzymatic assay. Ultrasonic measurements are shown to predict sugar contents in pure sugar solutions to within 0.2% w/v and in mixed sugar solutions to within 0.5% w/v. The ultrasonic measurements were sensitive to sugar species. It is shown that ultrasound compares well with other techniques for sugar content detn. in fruit juices and drinks, and has the advantage that the equipment can be used for on-line process control. Applications for this ultrasonic technique are proposed. AA

1359

Maltini (E), Nani (R) and Bertolo (G). **Role of serum viscosity and of pulp content in the vacuum belt drying of pure fruit juices.** *International Journal of Food Science and Technology*; 1992

Vacuum belt drying of fruit juice concentrates may be a satisfactory alternative to freeze-drying where cost is a limiting factor, and to spray-drying where the addition of large amounts of 'carriers', e.g. maltodextrin or glucose syrups, are required to avoid collapse and sticking of the product. The rheological and structural properties and the drying behaviour of some juice concentrates have been studied in relation to the collapse phenomenon, which is a structure transition associated with the mechanical properties of the system. Collapse during drying has proved to be mainly related to the viscosity (consistency) of the soluble fraction of the concentrate, i.e. the 'serum', while there is no evidence of an effect of the suspended phase (pulp). By properly adjusting the serum consistency of the juice with selected pectolytic enzymes and by appropriate mixing of the mash derivatives, apple, pear, apricot, and peach concentrates have been sucessfully dehydrated by vacuum belt drying, without any addition of 'carrier'-supporting materials. The consistency index of the concentrate serum may be used to assess the suitability of the juice for drying. AA

1360

Creaser (CS), Koupai-Abyazani (MR) and Stephenson (GR). **Gas chromatographic-mass spectrometric characterization of flavanones in citrus and grape juices.** *Analyst (London)* 117(7); 1992; 1105-1109

Reports a method for the characterization of flavanones in fruit juices (orange, lemon, grapefruit and grape juices), involving solvent extraction, hydrolysis to the corresponding aglycones trimethylsilylation and combined GCMS. The application of the method is demonstrated for the analysis of fruit juices. BV

Apple juices

1361

Dever (MC), Cliff (M) and Lau (OL). **Maturity and ripening effects on chemical and sensory properties of apple juice.** *Journal of the Science of Food and Agriculture* 60(3); 1992; 355-360

The effects of harvest maturity and ripening on the chemical composition and sensory characteristics of 'McIntosh' and 'Spartan' apple juice were evaluated. Juice was extracted from fruit harvested at seven weekly intervals beginning 3 - 4 weeks before commercial harvest and from fruit held in air storage (1°C) for 1 to 3 months. Internal ethylene concn. and starch index were used as maturity indices. Principal component analysis of juice data (pH, titratable acidity, organic acids, soluble solids, sugars, phenols, turbidity, and Hunter lab colour) showed a distinctive maturity effect on the characteristics of juice extracted from fruit immediately after harvest or after storage. Triangle testing showed aroma and flavour differences in both 'McIntosh' and 'Spartan' to be first discernable when ethylene was first detected (internal ethylene concn. > 0.1 μl litre^{-1}) and starch hydrolysis evident (starch index 3.0-5.0 for 'McIntosh', 1.5-3.0 for 'Spartan'), or after 2-3 months of air storage. Sensory profiling of fruit aroma, total aroma, fruit flavour by mouth, sweetness, and sourness in the juices showed increased fruitiness and sweetness and decreased sourness with advancing maturity. AA

Grape juices

1362

Garrido (VM), Sims (CA), Marshall (MR) and Bates (RP). **Factors influencing ellagic acid precipitation in muscadine grape juice during storage.** *Journal of Food Science* 58(1); 1993; 193-196

The ellagic acid sediment formed in white muscadine grape juice was quantified by isolation on a membrane (0.45 μm), dissolving in methanol and HPLC analysis. Heat processing 100°C for 10 min and high storage temp. of 40°C accelerated sediment formation in the juice. Treatment of juice with gelatin (0.05-0.4 g/L juice), egg albumen (6-10 mg/L juice) and polypyrrolidine (0.1-0.2 g/L juice) reduced sediment formation. A commercial pectinase added to grapes, resulted in higher levels of total phenolics in the juice and more sediment formation. Ultrafiltration membranes (10 000, 30

000 and 100 000 daltons MWCO) were effective in reducing sediment formation. SRA

Kinnow

1363

Ranote (PS), Bawa (AS) and Saini (SPS). **Thermal process for Kinnow - RTS.** *Indian Food Packer* 46(4); 1992; 16-24

The suitability of Kinnow fruit (*Citrus reticulata*) for conversion into ready-to-serve (RTS) beverage and its shelf-life under ambient temp. conditions were evaluated. Results revealed that there were negligible changes in the rheology, pH and acidity values of Kinnow - RTS beverage packed in flexible and rigid bottle and metallic containers stored at 12-38°C during 24 wk storage. Sugar content increased upon prolonged storage while the residual ascorbic acid and recoverable oil were not detected. Products stored in traditional packs like metallic and glass containers showed superior quality. Flexible pouches were economical. GS

1364

Ranote (PS), Saini (SPS) and Bawa (AS). **Shelf life of processed Kinnow juice.** *Research and Industry, India* 38(1); 1993; 15-18

The suitability of flexible container (pouch) for processing and storage of Kinnow mandarin juice was investigated. Analysis of jujice over a storage period of 6 months (12-38°C) indicated no discernible changes in most of the constituents. Negligible to slight changes in TSS, TS, acidity, pH, ash, protein and viscosity were recorded. Invert sugars improved while total sugars declined with the passage of time under ambient conditions. Cans retained higher amount of ascorbic acid during storage due to preventive effect against light. Various sensory attributes were significantly affected by packaging and storage. Though the comparative storage life was less in flexible pouch, yet it has promising future as a viable substitute because of many logistic advantages over traditional containers. AA

Lemon juices

1365

Achiwa (Y), Kada (T) and Namiki (K). **Inhibition of N-nitrosomorpholine formation by lemon juice.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(9); 1991; 826-830

Effect of lemon juice on formation of N-nitrosomorpholine was investigated on a reaction of morpholine and sodium nitrite. Lemon juice concentrate was added to the mixture of morpholine and sodium nitrite and formation of N-nitrosomorpholine was determined by HPLC analysis. Inhibitory effect on the N-nitrosomorpholine formation was 26% (in air) and 36% in (in air), 16% (in N2) and 35% (in N2), respectively, by the addition of original juice and 2-fold concentrated juice. Inhibitory effect on the N-nitrosomorpholine formation was 5% (2 mM, in air), 23% (5 mM, in air), 57% (10 mM, in N2) and 100% (20 mM, in air), 22% (2 mM, in N2), 57% (5 mM, in air) and 100% (10 mM and 20 mM, in N2) by the addition of ascorbic acid. Inhibition of ascorbic acid in lemon juice on the nitrosation of morpholine was 7.4%. Therefore the presence of inhibitory factors other than ascorbic acid in the lemon juice was estimated. AA

Raspberry juices

1366

Withy (LM), Nguyen (TT), Wrolstad (RE) and Heatherbell (DA). **Storage change in anthocyanin content of red raspberry juice concentrate.** *Journal of Food Science* 58(1); 1993; 190-192

The red raspberry juice concentrate (RRJC) stored for 3 months at +20°C showed significant decrease in cyanidin-3-sophroside and cyanidin-3-glucorutinoside and increase in cyanidin-3-glucoside. By comparison, levels of anthocyanins of RRJC changed slightly when stored for 3 months at -20°C. SRA

Tea

1367

Katiyar (SK) and Bhatia (AK). **Epicatechin derivatives and fatty acid composition of a traditional product made in Sikkim from leaves of *Camellia sinensis*.** *Journal of the Science of Food and Agriculture* 60(2); 1992; 271-273

A traditional product of *Camellia sinensis* leaves was recorded in tribal areas of Sikkim State, India. The product was analysed for its epicatechin derivatives, and for its neutral lipid, glycolipid and phospholipid contents together with their fatty acid compositions. (-)-Epigallocatechin-3-gallate (EGCG) was the main polyphenolic constituent present in this traditional product, accounting for 742 g kg^{-1} of total epicatechin derivatives. Glycolipids, which account for 570 g kg^{-1} of total lipid, contained a significantly greater amount of linolenic acid (C18:3, 546 g kg^{-1} of glycolipid) than the neutral lipids or phospholipids. Palmitic (C16:0) and linoleic (C18:2) acids were in greater proportion in the phospholipid fraction, while myristic (C14:0) and lauric (C12:0)

were abundant in the neutral lipid. Since EGCG is a known antimutagenic and anticarcinogenic agent, this traditional tea product may have considerable pharmacological significance. AA

FATS AND OILS

1368

Hierro (MTG) and Santa-Maria (G). **Supercritical fluid extraction of vegetable and animal fats with CO_2 - A mini review.** *Food Chemistry* 45(3); 1992; 189-192

The efficiency of the extraction increases with pressure (higher than 345 bar), and temp. The use of entrainers enhanced the extraction of lipids. Some procedures developed for extraction of glycerides containing polyunsaturated fatty acids from animal fats are listed which are useful in pharmacological applications. The extraction of cholesterol from fat and fractionation of milk fat yielding fractions with short and medium chain fatty acids enriched in cholesterol and fractions with medium- and long-chain fatty acids low in cholesterol are reviewed. 25 references. SD

Oils

1369

Sajid Husain, Nageswara Sarma (P), Sastry (GSR), Swami (GYSK) and Prasad Raju (N). **Evaluation of coconut and hydrogenated soybean oils as stationary phases for GLC.** *Indian Journal of Technology* 31(2); 1993; 103-108

Both coconut and hydrogenated soybean oils appear to be potential stationary phases for GLC. Classification of these stationary phases done according to McReynold's scheme, Novak's thermodynamic approach and Snyder's selectivity triangle are found to fall in the medium polar range. SRA

1370

Marinova (EM) and Yanishlieva (NV). **Effect of temperature on the antioxidative action of inhibitors in lipid autoxidation.** *Journal of the Science of Food and Agriculture* 60(3); 1992; 313-318

Purified lard triacylglycerols have been oxidised at 25, 50, 75 and 100°C in the presence and absence of 0.2-2.0 g kg^{-1} (0.45-10.3 mmol litre) of the antioxidants α-tocopherol and ferulic acid. Increasing the temp. does not influence the effect of ferulic acid on the induction period or the rate of autoxidation, α-tocopherol is more effective at extending the induction period and reducing the rate of autoxidation as the temp. is increased. The rate of substrate oxidation increases with increasing α-tocopherol concn., especially at lower temp., but decreases with increasing ferulic acid concn. This behaviour is explained in terms of the participation of antioxidant molecules and radicals in the autoxidation process. High-temp. oxidation results can be extrapolated only to room temp. when no change occurs in the antioxidative mechanism. AA

1371

Pinthus (EJ), Weinberg (P) and Saguy (IS). **Criterion for oil uptake during deep-fat frying.** *Journal of Food Science* 58(1); 1993; 204-205, 222

The effect of added powdered cellulose and methyl cellulose (Methocel) on oil uptake during deep-fat frying (DFF) of donuts and falafel balls is reported. The oil uptake criterion UR, was applied and found to be valuable in the assessment of effectiveness of reducing oil uptake during DFF. Methocel was more effective than powdered cellulose in reducing oil uptake. SRA

1372

Park (PSW). **Loss of volatile lipid oxidation products during thermal desorption in dynamic headspace-capillary gas chromatography.** *Journal of Food Science* 58(1); 1993; 220-222

Unsaturated aldehydes from lipid oxidation, t-2-hexenal, t-2-heptenal, t, t-2,4-heptadienal and t,t-2,4-decadienal were investigated for structural alteration during dynamic headspace (DHS)-GC analysis. After thermal desorption during which the GC carrier gas, hydrogen, flowed through Tenax TA adsorbent trap, both 2-alkenals and 2,4-alkadienals produced partially and fully hydrogenated compounds as artifacts. The loss due to hydrogenation was most severe with 2,4-decadienal, its recovery being 31.2%. Hydrogenated artifacts were not observed after thermal desorption with helium as the GC carrier gas. It is recommended that helium instead of hydrogen be used as the carrier gas in conducting DHS-GC analysis of unsaturated lipid oxidation compounds. AA

Soybean oils

1373

Jung (MY) and Min (DB). **Effects of oxidized α-, β- and γ-tocopherols on the oxidative stability of purified soybean oil.** *Food Chemistry* 45(3); 1992; 183-187

Oxidized tocopherols were prepared in methanol containing methylene blue for 30 h under light and their oxidative stability of purified soybean oil in the dark at 55°C were studied. As the concn. of oxidized tocopherol increased, the peroxide values increased and headspace oxygen decreased. They showed significant pro-oxidant effect on the peroxide value and headspace oxygen of soybean oil. SD

SPICES AND CONDIMENTS

1374

Kim (MR) and Rhee (HS). **Decrease of pungency in "Radish Kimchi" during fermentation.** *Journal of Food Science* 58(1); 1993; 128-131, 137

Acidity in radish kimchi increased with fermentation time, resulting in a gradual decrease in pH. Decrease of pungency was accompanied by a decrease in 4-methylthio-3-butenyl isothiocyanate (MTB-NCS) in the homogenate. Optimum flavour occured on the third day of fermentation when MTB-NCS concn.ration was 6.6+2 μmoles/100 g. The decrease in MTB-NCS concn. was accompanied by the gradual loss of 4-methylthio-3-butenyl glucosinolate (MTB-glucosinolate), which occurred more rapidly than the decline in total glucosinolates. Ascorbic acid-dependent myrosinase activity declined gradually until the third day of fermentation, although ascorbic acid content remained above that required for maximal enzyme activity. AA

Pickles

1375

Usha Rani (M), Rama Rao (SN), Girija Bai (R) and Nagaraja (KV). **Studies on quality standards of Indian commercial pickle.** *Indian Food Packer* 46(4); 1992; 27-33

Commercial pickles - oil/brine/vinegar based, stored at room temp. (RT) and 37°C for a yr were analysed for moisture, salt, pH, acidity, total oil, drainable oil, fluid portion, insect fragments/filth, trace elements, heavy metals and free fatty acid (FFA). Moisture, salt, pH, acidity, total oil, drainable oil and fluid portion showed no considerable change. FFA of oil pickles increased both at RT and 37°C. Heavy metal contaminants viz. Ar, Cd, Pb, Cu and Zn were within PFA/FPO limits. Tin and Fe contents of pickles stored in plain cans, and lacquered cans except polythene bag enclosed in lacquered can increased both at RT and 37°C. Samples with Sn and Fe contents exceeding 200 p.p.m. and 20 mg % respectively gave metallic after-taste. Samples in food grade polyethlene bags kept in lacquered can showed improved quality. GS

Olives

1376

Garcia (P), Brenes (M), Vattan (T) and Garrido (A). **Kinetic study at different pH values of the oxidation process to produce ripe olives.** *Journal of the Science of Food and Agriculture* 60(3); 1992; 327-331

The kinetics of the oxidation process to produce ripe olives were studied. The sodium hydroxide solutions used for treating the ripe olives contain the same polyphenols as the olives treated with these solutions. These liquids could be utilized as model systems to study the oxidation reactions of polyphenols. However, oxidation of the olive surface was remarkably slower because the diffusion rate of oxygen into the flesh of the fruit was very low. Oxidation of the polyphenols (hydroxytyrosol and caffeic acid) in the sodium hydroxide solutions followed first-order kinetics. The values of the constant for hydroxytyrosol were higher than those for caffeic acid and darkening of the liquids. Olive and solution colour were darker and oxidation rates increased with increasing pH. AA

Pepper

1377

Pino (JA), Borges (P) and Sanchez (R). **Alcohol deterpenation of black pepper oil.** *International Journal of Food Science and Technology* 27(5); 1992; 551-555

The alcohol extraction of black pepper oil using 3 different oil to 60%-alcohol ratios was studied. Quantitative composition of the oils was established through their physical constants and GLC. The 1:2 oil to 60% ethanol ratio showed the lowest oil recovery but resulted in sesquiterpeneless oil with the lowest terpene content and closest in sensory profile to the original oil. AA

SENSORY EVALUATION

1378

Lawless (H), Torres (V) and Figueroa (E). **Sensory evaluation of hearts of palm.** *Journal of Food Science* 58(1); 1993; 134-137

Hearts of palm were evaluated for their sensory properties using descriptive analysis and consumer appeal using consumer acceptance tests. Four var. of canned product, two from wild species and 2 from cultivated sp. and 1 fresh cultivated var. were

evaluated. Important sensory terms for texture, aroma and flavor were determined. Differences were observed between fresh and canned samples, with fresh samples firmer, sweeter, and less briny tasting. In spite of this difference, consumer reaction to the fresh samples was mixed, with a marked bimodal trend for acceptability of the firmer texture. Acceptability of the product in general (probed after the sensory test) was related to consumers previous exposure. A majority of those previously familiar with the vegetable expressed liking, while about half those who never tried the product before expressed liking. AA

1379

Rao (MA), Van Buren (JP) and Cooley (HJ). **Rheological changes during gelation of high-methoxyl pectin/fructose dispersions: Effect of temperature and aging.** *Journal of Food Science* 58(1); 1993; 173-176, 185

Gels made with 0.5% and 1% pectin in 60% fructose, and a commercial sample exhibited macromolecular solution/weak gel behavior. Cooling the gels from 50-10°C increased storage (G') and loss moduli (G") of the gels. As the rate of cooling (10, 5.7, and 2.5°C/h) a 1% pectin, 60% fructose, dispersion increased, the elasticity of the formed gel decreased; however, G" was not affected much by rate of cooling. During the first 24 h, the changes in G' and G" were small. After 14 days storage at ambient temp., G' values of gels increased substantially, while G" values increased slightly. AA

1380

Gay (C) and Mead (R). **A statistical appraisal of the problem of sensory measurement.** *Journal of Sensory Studies* 7(3); 1992; 205-228

Standard interval scales for sensory measurement are frequently arbitrary. In some situations the self-adjusting scale method has advantages, especially when the assessor training is insufficient and in consumer testing. When a small number of treatments are compared together in one block, say 3, then rank analysis by Pettitt is found more efficient than the self-adjusting scale. SD

1381

Pritchett Mangan (PA). **Performance assessment of sensory panelists.** *Journal of Sensory Studies* 7(3); 1992; 229-252

Statistics developed using replication variance of individual stimulus evaluations and scale utilization across a panelists' stimulus profile to enable comparison of panelists to each other, detn. of attributes where there was confusion, isolation of stimuli having unstable properties and engagement of influence wt. in subsequent analysis of data. The methodology developed could be adopted to other situations where replicated detn. from bounded quantitative scales used. SD

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

1382

Susha (C) and Kamavar (GK). **Effect of azadirachtin on vitellogenic oocyte development in *Trogoderma granarium* Everts (Coleoptera: Dermestidae).** *Indian Journal of Experimental Biology* 31(2); 1993; 188-190

Azadirachtin, a major component of neem seed extract, inhibits feeding, growth and reproduction in insects. In *Tr. granarium* a reduction in the vitellogenic number was observed when pupae were topically treated with azadirachtin. Disruption of the hormonal control of oocyte development is hypothesized to be the mode of action of azadirachtin. SRA

1383

Bhattacharya (PR). **Insecticidal crystal protein** (δ-endotoxin) production in ***Bacillus thuringiensis* var. israelensis is independent of sporulation specific functions.** *Indian Journal of Experimental Biology* 31(3); 1993; 247-251

Results showed that the processes of crystal production and those of sporulation are not dependent on each other and the synthesis and assembly of crystal protein can occur without the expression of spore specific functions at least in some cases, if not all, of crystal proteins. Crystal proteins are synthesized independent of sporulation specific functions and they also exhibit toxic effect. SRA

BIOCHEMISTRY AND NUTRITION

1384

Sangeeta Kaul and Krishnakantha (TP). **5'-nucleotidase activity in retinol deficiency induced albino rats.** *Indian Journal of Experimental Biology* 31(2); 1993; 147-150

Retinol deficient rat liver, kidney and spleen showed a significant decrease in their enzyme activity (36 to 50%) compared to controls. The lectins could stimulate the enzyme activity in retinol deficient group by 57.6 to 92% compared to controls (13.3 to 74%). Detergents increased the enzyme activity in retinol deficient tissue microsomes by 4.5-80% in comparison to controls (10.3 to 119%). The results reveal alterations in membrane structure induced by retinol deficiency. AA

1385

Kurup (PG) and Krishnamurthy (S). **Glycemic response and lipemic index of rice, ragi and tapioca as compared to wheat diet in human.** *Indian Journal of Experimental Biology* 31(3); 1993; 291-293

Carbohydrate rich diet, rice, ragi (*Eleucine coracana*) or tapioca given to individuals of both sexes for 15 days did not alter the glycemic response (after oral glucose loading) as compared to an isocaloric wheat basal background diet. However, plasma cholesterol profile was reduced significantly by ragi and tapioca. Ragi reduced total serum cholesterol; low density lipoporotein cholesterol by 9% each, triglycerides by 15% and increased high density lipoprotein cholesterol, showing a significant beneficial effect on plasma cholesterol profile. Lipemic index as introduced in the present study was 121, 57 and 55 for rice, tapioca and ragi respectively. when base line value of the isocaloric wheat supplemented back ground diet (control) was taken as 100. SRA

1386

Ramakrishnan (S), Venugopal Rao (A) and Pugalendi (KV). **Dietary protein and cholesterol metabolism in small intestines.** *Indian Journal of Experimental Biology* 31(3); 1993; 294-296

Effect of quality and quantity of dietary protein on blood cholesterol and cholesterol metabolism in small intestines of rat was examined. Compared to casein, Bengalgram in the diet decreased blood and intestinal cholesterol. It is suggested that this effect may be due to low levels of leucine in Bengalgram protein and less release of insulin, an activator of HMG CoA reductase. Low casein in the diet (12%) caused a decrease of blood and intestinal cholesterol while high casein in the diet (24%) caused a decrease of intestinal cholesterol only. It is suggested that both quality-wise and quantity wise, dietary protein influences body cholesterol. AA

1387

Kamala Krishnamurthy and Leela Raman. **Proceedings of Nutrition Society of India.** 37; 1991; xiii + 405

This volume provides the latest state-of-art on frontier areas of nutrition of global concern. The lectures include nutritional effects of palm oil: Myths and facts by Chang, Y.H. (pp. 41-58) and effect of mango consumption of vitamin A nutriture by Urmila Pingle and Sivakumar, B. (pp. 373-379). CSA

1388

Lim-Sylianco (CY) and Sylianco-Wu (L). **Antigenotoxic effects of B-vitamins.** *ASEAN Food Journal* 7(2); 1992; 100-104

The B-vitamins-thiamin, riboflavin, niacin, pyridoxine, pantothenic acid, folic acid, biotin and vitamin B-12 reduced the chromosome breaking effects induced by aflatoxin B-1, aflatoxin G-1, benzidine, dimethylnitrosamine, ethylmethanesulfonate (EMS), methyl-methanesulfonate (MMS) methylcholathrene (MC) metronidazole (MN) and safrole. Highest antigenotoxic activity was exhibited by niacin against MC threne and MN, EMS and MMS; PA against safrole and riboflavin against dimethylnitrosamine. SRA

1389

Jayasekara (S), Samarajeewa (U) and Jayakody (AN). **Trace metals in foods of animal origin in Sri Lanka.** *ASEAN Food Journal* 7(2); 1992; 105-107

Distribution of trace metals were examined in edible parts of cattle, goat, chicken, pork, canned fish and cows milk, buffalo's milk and egg. Trace metals range: in cattle - Co 0.90 plus or minus 0.17 (kidney) to 2.11 plus or minus 0.78 (spleen), Cu 0.08 plus or minus 0.01 (tongue) to 8.48 plus or minus 0.80 (liver), Mn 0.50 plus or minus 0.28 (muscle) to 5.45 plus or minus 0.25 (intestine), Zn - 1.57 plus or minus 0.37 (lung) to 13.45 plus or minus 1.12 (liver); goat - Co - 0.57 plus or minus 0.10 (muscle) to 8.58 plus or minus 0.15 (brain), Cu - 0.19 plus or minus 0.02 (brain) to 13.75 plus or minus 1.72 (liver), Mn 0.09 plus or minus 0.01 (liver) to 3.65 plus or minus 1.14 (brain), Zn - 1.16 plus or minus 0.17 (brain) to 4.17 plus or minus 0.17 (liver); Chicken - Co - 0.09 plus or minus 0.02 (muscle) to 2.87 plus or minus 0.72 (gizzard), Cu - 0.82 plus or minus 0.04 (liver) to 1.70 plus or minus 0.61 (gizzard), Zn - 1.90 plus or minus 0.31 (muscle) to 5.84 plus or minus 0.57 (liver); pork - Co - 0.11 plus or minus 0.02 (heart) to 0.56 plus or minus 0.34 (muscle), Cu - 0.03 plus or minus 0.01 (heart) to 2.59 plus or minus 0.84 (liver), Mn - not detected, Zn 0.03 plus or minus 0.01 (heart) to 2.59 plus or

minus 0.84 (liver); canned fish Co - 0.17 plus or minus 0.04 (fluid) to 1.62 plus or minus 0.32 (tissue), Cu - 0.14 plus or minus 0.04 (fluid) to 2.60 plus or minus 0.84 (tissue), Zn - 0.12 plus or minus 0.03 (fluid) to 3.88 plus or minus 0.23 (tissue); cow's milk - Co - 0.11 plus or minus 0.05, Cu - 0.03 plus or minus 0.01, Mn 0.03 plus or minus 0.01, Zn 0.15 plus or minus 0.05; buffalo's milk - Co 0.60plus or minus 0.13, Cu - 0.13 plus or minus 0.04, Mn - not detected, Zn - 0.09 plus or minus 0.01; egg - Co 0.21 plus or minus 0.12, Cu 0.05 plus or minus 0.01, Mn - not detected, Zn 0.71 plus or minus 0.28. SRA

1390

Narasinga Rao (BS). **Nutritional considerations in food processing: Process optimization for nutrient conservation - A national priority.** *Indian Food Industry* 11(5); 1992; 28-33

Facts about the nutrient losses during processing of foods and how they can be minimized with improved processing technology with respect to certain foods (cereal and legume grains, oilseeds and fat, fruits and vegetables) which are processed on large scale, marketed and consumed widely are discussed. The process conditions for maximal conservation of nutrients are also highlighted. CSA

1391

Ho (TA), Alldrick (AJ) and Rowland (IR). **Effect *in vitro* of arachidonic acid, eicosapentaenoic acid and docosahexaenoic acid on the hepatic, activation of dietary genotoxins by rat post-mitochondrial fractions.** *Food and Chemical Toxicology* 30(10); 1992; 853-858

The effect of arachidonic acid, eicosapentaenoic acid and docosahexaenoic acid on the conversion of the heterocyclic amine 2-amino-3-methylimidazo [4,5-f] quinoline (IQ) to its genotoxic metabolites was investigated using a modified bacterial mutation assay. The assay used *Salmonella typhimurium* TA98 as an indicator of the mutagenicity and heptatic post-mitochondrial fractions (S-9) from male Sprague-Dawley rats as the activating system. All three fatty acids inhibited the mutagenicity of IQ without effect on the uptake of the active metabolites and/or on the DNA repair processes within the bacterial cell. The activation of three other food mutagens, 2-amino-3,8-dimethylimidazo [4,5-f] quinoxaline (MeIQx), 2-amino-1-methyl-6-phenylimidazo [4,5-b] pyridine (PhIP) and aflatoxin B1 (AFB1) was also inhibited by these fatty acids. AA

1392

Shichino (Y), Tatemotsu (M), Ohshima (H), Bartsch (H), Furihata (C), Ito (N). **Effects of hickory-smoke condensate on development of pepsinogen 1-altered pyloric glands in rats.** *Food and Chemical Toxicology* 30(10); 1992; 859-864

Hickory-smoke condensate (HSC) is a popular food flavouring in the USA. Available data have suggested that this food additive has tumour-initiating/promoting potential. Accordingly, a commercial HSC has been investigated for its capacity to promote tumours in the rat glandular stomach using pepsinogen 1 (Pg 1)-altered pyloric glands (PAPG) as the marker of preneoplastic lesions. The development of PAPG initiated by a single intragastric administration of N-methyl-N'-nitroso-N-nitrosoguanidine was significantly increased by feeding rats a diet containing 5% HSC; no effect was observed with lower doses (1.25 or 2.5%) of HSC. The results suggest that HSC has weak tumour-promoting potential in the rat glandular stomach. AA

1393

Paraf (A). **A role for monoclonal antibodies in the analysis of food proteins.** *Trends in Food Science and Technology* 3(10); 1992; 263-267

Reviews the role of a range of monoclonal antibodies (MAbs) in the analysis of food proteins; authenticity testing and detection of adulteration, monitoring structural changes that occur during thermal processing, the detection of known food allergens; the characterization of fermentation starter cultures; and quality control of food stuffs. 45 references. GS

1394

McGaw (BA). **Trace studies of nutrient bioavailability using 'naturally enriched' ^{13}C-labelled substrates.** *Trends in Food Science and Technology* 3(10); 1992; 268-271

Reveiws the attempts for exploitation of natural variations in ^{13}C-enrichment of certain plant species; the use of these plants as 'naturally enriched' substrates for measuring body tissues and stores; and the bioavailability of nutrients in humans. 16 references. GS

1395

Alcock (SC), Finglas (PM) and Morgan (MRA). **Production and purification of an R-protein-enzyme conjugate for use on a microtitration plate protein-binding assay for vitamin B_{12} in fortified food.** *Food Chemistry* 45(3); 1992; 199-203

The limit of detection of the assay developed was 9 pg per well and the assay sensitivity 0.09 μg/100 g of food. The immobilized phase of assay, a

B_{12}-keyhole limpet haemocyanin passively adsorbed to the plate wells, was synthesized and it was simple to perform. SD

TOXICOLOGY

1396

Trivedi (AB), Doi (E) and Kitabatake (N). **Toxic compounds formed on prolonged heating of citrinin under watery conditions.** *Journal of Food Science* 58(1); 1993; 229-232

1397

Sato (M), Furukawa (F), Toyoda (K), Mitsumori (K), Nishikawa (A), Takahashi (M). **Lack of carcinogenicity of ferric chloride in F344 rats.** *Food and Chemical Toxicology* 30(10); 1992; 837-842

The carcinogenicity of ferric chloride, a compound, that is used as a food additive throughout the world to modified milk powder, was examined in F344 rats of both sexes. Results indicated that ferric chloride exerts no carcinogenic activity in F344 rats when administered as a 0.25 or 0.5% solution continuously in the drinking water for up to 2 yr. BV

1398

Schdatter (J), Wurgler (FE), Kranzlin (R), Maier (P), Holliger (E), Graf (V). **The potential genotoxicity of sorbates:.Effects on cell cycle in vitro in V79 cells and somatic mutations in *Drosophila*.** *Food and Chemical Toxicology* 39(10); 1992; 843-851

Sodium sorbate, potassium sorbate and an oxidation product of sodium sorbate, 4,5-epoxy-2-hexenoic acid, were tested for their genotoxic potential in cultured V79 Chinese hamster cells and in somatic cells of *Drosophila melanogaster* (wing spot test, SMART). In *Drosophila* only the epoxide showed a weak genotoxic effect. In V79 cells, freshly prepared sodium sorbate solutions at the highest concn. only (2.5 mg/ml, 24 hr exposure) arrested mitosis ast the G2/M cell cycle phase and potassium sorbate (2.5 mg/ml) had no effect. This arrest was reversible aftef a 24-hr recovery interval. Sodium sorbate solutions stored for up to 208 days were cytotoxic at 2.5 mg/ml, induced cell cycle arrest in the G2/M phase and increased cellular protein content, indicating an action similar to spindle poisoning and a chemical stress reaction (adaptation processes, modification of transcription). Potassium sorbate solutions stored for 28 days were also cytotoxic. With 4,5-epoxy-2-hexenoic acid at concn. upto 0.01 mg/ml no effects were seen. At higher concn. (at lest 0.1 mg/ml) cell killing was observed, which probably resulted from unphysiologically lowered pH in the culture medium. Overall, the results are interpreted as an indication of a weak genotoxic potential of stored sodium sorbate solutions. Thus sorbic acid and its potassium salt at the concn. used for food preservation can still be considered as safe for human consumption. AA

1399

Culvenor (CCJ). **Toxic plant constituents in foods.** *Food Australia* 44(2); 1992; 73-75

Few toxic constituents of plants in regular food supply of Australia, which occur at low levels, exert chronic toxicity and are either known to be or probably carcinogenic: the toxins cycads, mushrooms and bracken, and pyrrolizidine alkaloids are briefly discussed in this article. SRA

FOOD LAWS AND REGULATIONS

Nil

AUTHOR INDEX

AFST(I) (Mysore)
1283
Abdullah (A)
1357
Abichandani (H)
1211
Achiwa (Y)
1365
Ahmad (MH)
1253
Ahmed (R)
1281
Ahn (DU)
1329
Ajay (G)
1279
Ajuyah (AO)
1329
Alcock (SC)
1395
Alldrick (AJ)
1391
Alvarado (MG)
1248
Anandha Rao (M)
1330
Anderson (ME)
1313
Aranda (M)
1321
Arihara (K)
1216
Arnold (RN)
1310
Arora (KL)
1297
Arp (SC)
1310
Arul (J)
1278
Arun Kumar (GC)
1226
Asemota (HN)
1253
Atienza (J)
1286
Aubourg (S)
1338
Azam-Ali (SN)
1231
Azuara (E)
1205
Babbitt (JK)
1323 1336
Babic (I)
1247
Bajwa (IS)
1328
Bakir (HM)
1347
Balkissoon (F)
1270
Banerji (RK)
1279
Banon (S)
1289
Baron (RF)
1232
Barth (MM)
1256
Bartsch (H)
1392
Bastias (JM)
1321
Basu (CK)
1266
Bates (RP)
1362
Batish (VK)
1291
Bawa (AS)
1363 1364
Bell (JD)
1346
Bell (LN)
1214
Beristain (CI)
1205
Bermudez (A)
1274
Berry (BW)
1311
Bertolo (G)
1359
Beuchat (LR)
1357
Bhatia (AK)
1367
Bhattacharya (PR)
1383
Bhattacharyya (AR)
1318
Bhavadasan (MK)
1284
Bhowmik (SR)
1260
Blanchard (SP)
1326
Bodyfelt (FW)
1288
Boidron (J-N)
1355
Bonnet (M)
1314
Borges (P)
1377
Bouillanne (C)
1241
Bouquant (J)
1222
Bouzas (J)
1335
Brenes (M)
1376
Briones (GL)
1222
Brough (SH)
1231
Buchanan (RL)
1218 1219
Bureau (G)
1222
Cai (PX)
1354
Carpi (G)
1259
Cassens (RG)
1216
Castaigne (F)
1278
Castrillo (M)
1274
Chakraborty (BK)
1297
Chambroy (Y)
1222
Chan (KM)
1306
Chan (W-Y)
1271
Chan (WH)
1354
Charles (JC)
1345
Chatonnet (P)
1355
Chiang (B-H)
1271
Chiba (M)
1290
Claassen (MR)
1285
Cliff (M)
1361
Contreras (NJ)
1358
Cooksey (K)
1307
Cooley (HJ)
1379

Cornforth (DP)
1315
Cortes (R)
1205
Creaser (CS)
1360
Culvenor (CCJ)
1399
Cuq (J-L)
1227
Daeschel (MA)
1288
Dall'Aglio (G)
1259
d'Amour (J)
1278
Dave (JM)
1295 1296
Decker (EA)
1306
deLeon (SY)
1267
Demertzis (PG)
1320
Desmazeaud (MJ)
1241
Dever (MC)
1361
Dhir (DS)
1328
Dickson (JS)
1312 1313
Dodd (NJF)
1327
Dodeja (AK)
1211
Doi (E)
1396
Dondero (M)
1335
Dubourdieu (D)
1355
Ebana (RUB)
1258
Eipeson (WE)
1260
Ellekjaer (MR)
1305
Erickson (MC)
1340 1341
Esguerra (EB)
1268
Essien (AJ)
1258
Eun (J-B)
1339
Fairley (P)
1358
Fernandez (M)
1342
Fiddler (W)
1323
Figueroa (E)
1378
Finglas (PM)
1395
Fletcher (GC)
1345
Fujimoto (K)
1304
Fujio (Y)
1238 1243
Furihata (C)
1392
Furukawa (F)
1397
Gaal (O)
1331
Gallardo (JM)
1338
Garcia (HS)
1205
Garcia (P)
1376
Garcia Zepeda (CM)
1316
Garrido (A)
1376
Garrido (VM)
1362
Gates (RA)
1323
Gay (C)
1380
Gennadios (A)
1352
Genovese (MI)
1244
Ghizzoni (C)
1259
Ghorpade (VM)
1315
Girija Bai (R)
1375
Gloria del Campo.
1356
Godber (JS)
1334
Gomez (MH)
1245
Gontard (N)
1227
Gosselin (C)
1278
Gothwal (PP)
1284
Goyal (GK)
1299
Graf (V)
1398
Grompone (MA)
1342
Grover (S)
1291
Guerrero (A)
1319
Guilbert (S)
1227
Guiraud (J)
1247
Gupta (VK)
1293 1297
Guruprasad (KN)
1257
Haard (NF)
1350
Haishun (J)
1327
Hale (M)
1323
Hardin (RT)
1329
Hardy (J)
1289
Hashimoto (H)
1290
Hassan (HN)
1302
Hayakawa (I)
1238 1243
Hayashi (N)
1238 1243
Hearnsberger (JO)
1339
Heatherbell (DA)
1366
Herrero (MA)
1286
Hierro (MTG)
1368
Hilbert (G)
1247
Ho (C-T)
1213
Ho (TA)
1391
Holliger (E)
1398
Hosoda (M)
1290
Hosono (A)
1290
Hsieh (YL)
1330 1332
Huang (VT)
1212
Huidobro (A)
1349
Hunt (MC)
1316

Hwang (KT)
1343
Hwang (S-J)
1229
Ito (N)
1392
Itoh (K)
1224
Itoh (M)
1216
Iyengar (V)
1215
Izzo (HV)
1213
Jagerstad (IM)
1208
Jagerstad (M)
1207
Jahncke (M)
1323
Jain (A)
1263
Jakhu (R)
1199
Jayakody (AN)
1389
Jayasekara (S)
1389
Jood (S)
1228
Joshi (KC)
1239
Joshi (SV)
1198
Joy (CPH)
1333
Jung (D-S)
1288
Jung (MY)
1373
Kada (T)
1365
Kalra (MS)
1223
Kamala Krishnamurthy
1387
Kamavar (GK)
1382
Kamel (BS)
1282
Kanawjia (SK)
1292
Kantt (CA)
1335
Kapoor (A-C)
1228
Kashima (M)
1304
Kastner (CL)
1316
Katiyar (SK)
1367
Kawada (K)
1268
Kawamura (S)
1224
Kejriwal (NM)
1261
Kenney (PB)
1316
Kennish (JM)
1344
Kerbel (EL)
1256
Khan (AQ)
1281
Kim (BK)
1308 1309
Kim (JM)
1339
Kim (MR)
1374
Kinsella (JE)
1300
Kishi (M)
1298
Kitabatake (N)
1396
Kitagawa (H)
1268
Klawitter (LA)
1218 1219
Klein (BP)
1307
Kondaiah (N)
1325
Kondo (Y)
1216
Kondyli (E)
1320
Kontominas (MG)
1320
Kopp (J)
1314
Koria (RG)
1280
Koupai-Abyazani (MR)
1360
Kramer (DE)
1344
Kranzlin (R)
1398
Kremers (W)
1319
Krishnakantha (TP)
1384
Krishnamurthy (S)
1385
Kropf (DH)
1316
Kruger (J)
1317
Kubota (K)
1251
Kudou (S)
1237
Kulkarni (SD)
1239
Kumbhar (BK)
1273
Kurup (PG)
1385
Kushida (H)
1216
Labuza (TP)
1214
Lajo (MC)
1356
Lajolo (FM)
1244
Landon (M)
1241
Lau (OL)
1361
Lawless (HT)
1285 1378
Lea (JS)
1327
Lebovics (VK)
1331
Lee (AWM)
1354
Lee (E)
1334
Lee (JK)
1245
Lee (S-Y)
1294
Leela Raman
1387
Lim-Sylianca (CY)
1267 1388
Lindsay (JA)
1217
Litchfield (JB)
1210
Liu (H)
1252
Low (SL)
1348
Lozano (JE)
1269
Lsalsangzuala (J)
1201
Luchansky (JB)
1216
Lund (DB)
1212
Lurie (S)
1275

Lyon (BG)
1276
Maduako (O)
1240
Maeshige (S)
1251
Magee (TRA)
1249
Mahmoud (R)
1301
Maier (P)
1398
Majeed (SA)
1255
Mallorca (R)
1267
Maltini (E)
1359
Malundo (TMM)
1357
Maquieira (A)
1286
Marinova (EM)
1370
Marshall (MR)
1362
Marshall (RT)
1313
Martin (JW)
1322
Masuda (Y)
1298
Mathur (BN)
1351
Matsuura (M)
1236
Matta (H)
1223
McClane (BA)
1220
McClements (DJ)
1358
McDonough (C)
1245
McGaw (BA)
1394
McKeith (FK)
1307
Mead (R)
1380
Means (WJ)
1306
Medina (I)
1338
Medina (JDLC)
1248
Melton (SL)
1347
Mendez (E)
1342
Meredith (FI)
1276
Meyers (SP)
1334
Min (DB)
1373
Mistry (VV)
1302
Mitsumori (K)
1397
Miyazawa (T)
1304
Molla (AR)
1202
Mondy (NI)
1250
Morgan (MRA)
1395
Morita (H)
1290
Morr (CV)
1294
Munshi (CB)
1250
Murti (TW)
1241
Myhara (RM)
1233
Naczk (M)
1233
Nagaraja (KV)
1375
Nagegowda (V)
1255
Nageswara Sarma (P)
1369
Namiki (K)
1365
Nani (R)
1359
Narasinga Rao (BS)
1390
Narayanan (PV)
1206
Natesan (kP)
1200
Naude (R)
1317
Neelankantan (S)
1291
Nguyen (TT)
1366
Nguyen-The (C)
1247
Nielsen (TJ)
1208
Nishikawa (A)
1397
Nortje (G)
1317
Nsofor (LM)
1240
Obata (A)
1236
Odutuga (AA)
1253
Ohshima (H)
1392
Okazaki (T)
1251
Okubo (K)
1237
Olafsson (G)
1207
Osorio (A)
1321
Oste (RE)
1207 1208
Ouali (A)
1314
Panda (B)
1325
Pandhi (DP)
1265
Paraf (A)
1393
Park (J)
1308 1309
Park (PSW)
1372
Pascat (B)
1222
Patel (MS)
1280
Pazo (G)
1342
Penfield (MP)
1232
Pensabene (JW)
1323
Perez-Martin (R)
1338
Perry (AK)
1256
Petersen (A)
1303
Pino (JA)
1377
Pinthus (EJ)
1371
Poernomo (A)
1337
Polara (JV)
1280
Pons (M)
1355
Poonam Aggarwal
1254
Porretta (S)
1259

Porter (PJ)
1344
Povey (MJW)
1358
Prahlad (SN)
1262
Prakash (V)
1235
Prasad Raju (N)
1369
Prescott (J)
1346
Pritchett Mangan (PA)
1381
Pruthi (JS)
1272
Puchades (R)
1286
Pugalendi (KV)
1386
Raats (MM)
1287
Rahman (MS)
1204
Rajarathnam (S)
1221
Rajendran (S)
1235
Raksakulthai (N)
1350
Ram Gopal
1324
Rama Rao (SN)
1375
Ramakrishnan (S)
1386
Ramana (SV)
1246
Rangarao (GCP)
1209
Ranote (PS)
1363 1364
Rao (MA)
1379
Regenstein (JM)
1330 1332 1343
Reppond (KD)
1336
Resurreccion (AVA)
1357
Rhee (HS)
1374
Rhee (KC)
1308 1309
Rhee (KS)
1308 1309
Robertson (JA)
1276
Rogers (RW)
1322
Rooney (LW)
1245
Roos (O)
1321
Rouseff (RL)
1353
Rowland (IR)
1391
Saca (SA)
1269
Sachdev (AK)
1324
Saguy (IS)
1371
Saini (SP)
1254
Saini (SPS)
1277 1363 1364
Sajid Husain
1369
Samarajeewa (U)
1389
Sanchez (R)
1377
Sangeeta Kaul
1384
Sankat (CK)
1270
Sannabhadti (SS)
1295 1296
Santa-Maria (G)
1368
Sapru (V)
1217
Sarkar (B)
1197
Sarkar (SP)
1295 1296
Sarma (SC)
1211
Sastry (GSR)
1369
Satija (V)
1242
Sato (M)
1397
Savello (PA)
1301
Schaefer (DM)
1310
Schdatter (J)
1398
Scheller (KK)
1310
Schleusener (DS)
1316
Schmidt (SJ)
1210 1256
Scholtz (E)
1317
Schwenke (JR)
1316
Scott (DN)
1345
Sekhon (BS)
1242
Shah (KK)
1212
Shahidi (F)
1233
Shashirekha (MN)
1221
Sheen (S)
1212
Shepherd (R)
1287
Shewfelt (RL)
1340
Shichino (Y)
1392
Sim (JS)
1329
Sims (CA)
1362
Singh (A)
1223
Singh (B)
1230 1328
Singh (H)
1319
Singh (R)
1242
Singh (S)
1292
Singh (U)
1230
Smerage (GH)
1217
Sood (SM)
1242
Stauffer (CE)
1282
Stephenson (GR)
1360
Stevenson (MH)
1203
Sun (X)
1210
Sundaram (RNS)
1318
Suparno
1337
Susha (C)
1382
Suzuki (K)
1251
Swallow (AJ)
1327
Swami (GYSK)
1369

Sweet (SS)
1257
Sylianco-Wu (L)
1388
Takahashi (M)
1397
Takahashi (T)
1234
Tatemotsu (M)
1392
Taylor (AJ)
1246
Teixeira (AA)
1217
Tejada (M)
1349
Testin (RF)
1352
Thakur (S)
1264
Thapa (TB)
1293
Thed (ST)
1340
Tong (CH)
1212
Torres (JA)
1335
Torres (V)
1378
Toyoda (K)
1397
Trehan (PK)
1328
Trivedi (AB)
1396
Trivino (I)
1321
Uchida (T)
1237
Udo (HB)
1258
Ugajin (I)
1298
Usha Rani (M)
1375
Uzawa (M)
1298
Van Buren (JP)
1379
Varoguaux (P)
1222
Vattan (T)
1376
Venugopal Rao (A)
1386
Verma (SS)
1324
Waliszweski (KN)
1248
Wani (MA)
1277
Waniska (RD)
1245
Weinberg (P)
1371
Weller (CL)
1352
Wellington (MA)
1253
Wesslen (B)
1207
Wilkinson (CPD)
1249
Willemot (C)
1278
Williams (SN)
1310
Wilson (JL)
1347
Withy (LM)
1366
Wong (RJ)
1345
Wright (CJ)
1246
Wrolstad (RE)
1366
Wurgler (FE)
1398
Wurm (CM)
1250
Xiong (YL)
1326
Yanishlieva (NV)
1370
Yasui (T)
1225
Yeh (A-I)
1229
Yost (RA)
1300
Yu (SY)
1348
Zakia Bano
1221

Acetic acid
polyethylene layers/Al foil, acetic acid & detn. of 1207
Acidification
milk, glucono-δ-lactone & acidification of 1289
Aflatoxins
nutmegs, aflatoxin contamination analysis TLC spots interference in 1234
Alaska Pollock
frankfurters, N-nitrosodimethylamine formation in fish-meat 1323
Albacore
fatty acid composition analysis methylation in albacore lipid 1338
Alcohol
black pepper oil, alcohol deterpenation of 1377
Aldehydes
loss of volatile lipid aldehydes 1372
Aluminium foil
acetic acid & detn. of Al foils 1207
Amaranthus
betacyanin synthesis in Amaranthus caudatus 1257
Amino acids
fish sauces, amino acid concn. & flavour of 1350
ice creams, amino acids of commercial vanilla 1298
Anthocyanins
raspberry juice concentrates, anthocyanin content of stored 1366
Antibodies
food proteins, monoclonal antibodies & analysis of 1393
Antimutagenicity
cultured milk antimutagenicity against N-methyl-N'-nitro-N--nitrosoguanidine 1290
Antioxidants
broiler chicken meats, dietary antioxidant & chemical properties of fatty acid enriched 1329
catfish muscle microsomes, antioxidants & lipid peroxidation of 1339
Apple juices
maturity/fruit ripening & chemical/sensory properties of apple juices 1361
Arachidonic acid
genotoxins, arachidonic acid & hepatic activation of dietary 1391
Aroma compounds
LDPE, aroma compounds absorption into 1208
Ascorbate
catfish, ascorbate absorption by live 1340
Ascorbic acid
broccoli, packaging modified atm. & ascorbic acid in 1256
Aspergillus niger
soy saponins, Asp. niger effect on 1237
Azadirachitin
Trogoderma granarium, azadirachitin & vitellogenic oocyte development in 1382
Bacillus stearothermophilus
sterilization temp. & spores of B. stearothermophilus 1217
Bacillus thuringiensis
crystal protein insecticidal production in B. thuringiensis 1383
Bacon
nonane in irradiated bacon 1319
Bacteria
beef carcass tissue, washing & bacterial penetration into 1313
Bakeries
SISI & bakery industry 1283
baking industry 1283
fats-bakeries 1283
problems of Indian baking industries 1283
Bakery products
diversification of bakery products in small scale sector 1283
marketing of bakery products 1283
nutritive value of bakery products 1283
quality standards of bakery products 1283
sensory evaluation in baked goods 1282
texture of baked goods 1282
varieties in bakery products 1283
Baking
developments in baking technology, book 1283
emulsifiers in baking 1282
technology, advances in baking, book 1282
wheat disease & baking quality 1283
Bambara groundnuts
soil moisture & comp. of bambara groundnut 1231
Bananas
puffing of bananas 1269
temp. & ripening behaviour of 'Senorita' bananas 1268
Beef
blends, high-protein texturized products of defatted soy flour/corn starch/beef 1309
carcass tissue, washing & bacterial penetration into post-rigor beef 1313
cooking temp. DSC of beef 1305
extrusion single-screw of defatted soyflour/corn starch/beef blends 1308
muscle, osmotic pressure DSC of beef 1314
muscles, carnosine in beef 1306
patties, fat level/freezing temp. & properties of beef 1311
steaks, heating & texture of packaged pasteurized beef lion 1307
tissue, menstrua contamination of beef 1312
Beer
bitterness in beer 1353
ethanol differential-pulse polarographic microdetn. & analysis of beer 1354
Betacyanin
Amaranthus caudatus, betacyanin synthesis in 1257
Beverages
bitterness in beverages 1353
kinnow-citrus reticulata RTS beverages, thermal process for 1363
nisin & shelf-life of alcoholic beverages 1223
Biacetyl
wine distillates, biacetyl spectrophotometric detn. in 1356
Bifidobacterium
yoghurt-type products, bifidobacterium ssp. & bacterial growth/volatile compounds in soy milk based 1241
Bioavailability
nutrient bioavailability assay

using /sup 13/C labelled substrates 1394
Bioprocesses
infant formulas, bioprocesses & protective factors amelioration in 1351
Biotechnology
Cheddar cheese, biotechnology & accelerated ripening of 1292
poultry processing & biotechnology 1324
Bitterness
foods/beverages, bitterness in 1353
Bread
baking technology & rye bread 1282
baking technology & wholemeal bread 1282
processing, trends in bread 1283
production, machinery for bread 1283
Broccoli
packaging modified atm. & quality of broccoli 1256
Broilers
chicken meats, dietary antioxidant/storage & chemical properties of fatty acid enriched broiler 1329
plumage colours & body wt./abdominal fat/carcass characters in broilers 1328
Browning
dairy products, browning characteristics of 1284
Butterfat
whey protein gels, emulsified butterfat & properties of acidic 1300
By-products
crab by-products, development/sensory evaluation of minced meat crabcake from blue 1334
flour milling industry by-products 1283
Calcium
milk, Ca spectrophotometric detn. in 1286
Caliberation
reference materials for caliberating probes 1212
Calorimetry
beef, cooking temp. DSC of 1305
Carambola
packaging/refrigeration & shelf-life of carambola 1270
Carbamates
potatoes, moisture/dry heat & carbamate residue reduction in 1250
Carcasses
broilers, plumage colours & carcass characters in 1328
Carcinogenicity
ferric chloride carcinogenicity in rats 1397
Carnobacterium piscicola
Listeria monocytogenes, Carnobacterium piscicola & control of 1219
Listeria monocytogenes, temp. & Carnobacterium piscicola activity against 1218
Carnosine
beef muscles, carnosine in 1306
Carrots
ready-to-use carrots, yeast spoilage in 1247
tissues, cooking & firmness measurement in carrot 1246
Cassava flour
hydrolysis-enzymatic of cassava flour 1248
Catalase
shrimp, catalase sol. & microbial spoilage control in 1335
Catfish
ascorbate absorption by live catfish 1340
muscle microsomes, antioxidants/activators/ /inhibitors & lipid peroxidation 1339
muscles, lipid extraction solvent systems from catfish 1341
Cheddar cheese
biotechnology & accelerated ripening of Cheddar cheese 1292
Cheese
nisin & shelf-life of cheese 1223
shelf-life improvement/safety of cheese 1291
whey protein concentrates & sensory/rheological characteristics of stored cheese 1293
Chemistry
flavour chemistry 1213
Chick peas
processing & nutritional value of chick peas 1230
Chickens
broiler chicken meats, dietary antioxidant/storage & chemical properties of fatty acid enriched 1329
free radicals yield in irradiated chicken bones 1327
myofibrillar protein-polysaccharide composite gels, viscoelastic properties of 1326
processing/utilization of spent hens 1325
Chips
tortilla chips, microstructure electron microscopic evaluation during deep-fat frying of 1245
Chlorides
milk, chloride spectrophotometric detn. in 1286
Cholesterol
dietary protein & cholesterol metabolism in small intestines 1386
egg powder, cholesterol oxides in irradiated spray-dried 1331
Chromobacterium violaceum
metmyoglobin conversion to myoglobin by Ch. violaceum 1216
Ciders
bitterness in fermented apple ciders 1353
Citrinin
toxic compounds formation during heating of citrinin 1396
Citrus juices
flavanones GC-MS characterization in citrus juices 1360
limonoids in citrus juices 1353
Citrus reticulata
see Mandarin
Clarification
plum pulps, enzymatic clarification of 1277
Closteridium perfringens
enterotoxins 1220
Coconut oils
stationary phases for GLC, coconut oil as 1369
Coffee
bitterness in coffee 1353
whitener, sensory evaluation/optimization of peanut milk-based liquid coffee 1357
Colour
pork roasts, temp. & pink coloration pigments in 1315
Conditioning
wheat conditioning 1226
Contamination
beef tissue, menstrua contamination of 1312
Cooking
beef patties, fat level freezing temp. & cooking properties of 1311
beef, cooking temp. DSC of 1305

carrot tissues, cooking & firmness measurement in 1246
hake roe, cooking & lipids in 1342
Corn starch
blends, extrusion of defatted soy flour/corn starch/beef 1308
blends, high-protein texturized products of defatted soy flour/corn starch/beef 1309
rice cake, waxy maize starch adulteration detection in 1225
Crabs
minced meat crab cake from blue crab by-products, development/sensory evaluation of 1334
Cracker
fish cracker manufacture, tapioca starch for 1348
Cream
whipped cream, staining method & microstructure of 1294
Ctenopharyngodon idella
see white amur
Cultured milks
shelf-life improvement/safety of cultured milks 1291
Dahi
misti dahi thermization & acid producers count 1295
misti dahi thermization & shelf-life/β-D--galactosidase activity 1296
shelf-life improvement/safety of dahi 1291
Dairies
heat exchangers for dairies 1211
Dairy products
bitterness in dairy products 1353
browning characteristics of dairy products 1284
Dehydration
foods, osmotic dehydration kinetics of 1204
Dietary fibers
baking & dietary fibers 1282
Differential scanning calorimetry
beef muscle, osmotic pressure DSC of 1314
Dioctyladipate
meat products, dioctyladipate migration into ground 1320
Diphenolase
yam tubers, storage & o-diphenalase of 1253
Docosahexaenoic acid
genotoxins, docosahexaenoic acid & hepatic activation of dietary 1391
Dough
enzymes, dough improvers 1282
frozen dough production 1282
rheology of dough 1282
Drying
Fick's second law & osmotic dehydration 1205
fruit juices, serum viscosity & vacuum belt drying of 1359
potato slices, process varibales & drying of 1249
Egg powder
cholesterol oxides in irradiated spray-dried egg powder 1331
Egg white
gels, failure deformation/stress relaxation of heated egg white 1332
Eicosapentaenoic acid
genotoxins, eicosapentaenoic acid & hepatic activation of dietary 1391
Electron microscopy
whipped cream, staining method & microstructure of 1294
Ellagic acid
grape juices, ellagic acid precipitation in stored muscadine 1362
Emulsifiers
Listeria monocytogenes, emulsifiers & nisin inhibition of 1288
Enterotoxins
Closteridium perfringens enterotoxins 1220
Enzymes
broccoli, packaging modified atm. & enzymic activity in 1256
dough improvers & enzymes 1282
plum pulps, enzymatic clarification of 1277
Epicatechin
tea, epicatechin of Sikkim 1367
Equipments
bread production, equipments for 1283
dairies, heat exchangers for 1211
Export
fruit/vegetables, export of 1261
Extraction
carnosine extraction from beef muscle 1306
catfish muscles, lipid extraction solvent systems from 1341
fats, extraction supercritical CO_2 of vegetable/animal 1368
Extruder
soy extrudates, extruder-twin screw & texture evaluation of dehulled whole soybean 1238
wheat flour, extruder-twin screw & extrusion cooking of 1229
Extrusion
bakery products, extrusion in 1282
blends, extrusion single-screw of defatted soy flour/corn starch/beef 1308
wheat flour, extruder-twin screw & extrusion cooking of 1229
Fats
bakery fats 1283
substitute for fats 1282
Fats animal
beef patties, fat level & properties of 1311
broilers, plumage colours & abdominal fat in 1328
extraction supercritical CO_2 of animal fats 1368
frankfurters, cure level/processing method/meat source & production of low-fat 1322
Fats milk
Listeria monocytogenes, fats & nisin inhibition of 1288
milk, fats & free-choice profiling of 1287
Fats vegetables
extraction supercritical CO_2 of vegetable fats 1368
Fatty acid
albacore lipid, fatty acid composition analysis methylation in 1338
Fatty acids
broiler chicken meats, dietary antioxidant/storage & chemical properties of fatty acid enriched 1329
genotoxins, fatty acids & hepatic activation of dietary 1391
tea, fatty acid composition of Sikkim 1367
white amur, diets & fatty acids of 1347
Fermentation
raddish kimchi, fermentation & pungency in 1374
Fermented foods
milk products, shelf-life improvement/safety of fermented 1291
Ferric chloride
rats, ferric chloride carcinogenicity in 1397
Ferulic acid
lipid autoxidation, temp. & ferulic acid inhibition of 1370

Firmness
carrot tissues, cooking & firmness measurement in 1246
Fish
lipid hydroperoxides fluorometric peroxygenase assay in fish 1304
minces, foaming capacity of frozen stored fish 1349
smooth oreodory, cold storage & spoilage of 1345
waste utilization in Indonesia 1337
Fish products
sauces, peptides/amino acids & flavour of fish 1350
Flavanones
citrus/grape juices, flavanones GC-MS characterization in 1360
Flavour
chemistry-flavour 1213
fish sauces, peptides/amino acids & flavour of 1350
Flounder
protease inhibitors & physical properties of arrowtooth flounder 1336
Flour
by-products of flour milling industry 1283
commercial flour & additives 1283
Fluorometry
meat/fish, lipid hydroperoxides fluorometric peroxygenase assay in 1304
Foaming
fish minces foaming capacity of frozen stored 1349
Frankfurters
cure level/processing method/meat source & production of low-fat frankfurters 1322
fish-meat frankfurters, N-nitrosodimethylamine formation in 1323
Freezing
beef patties, freezing temp. & properties of 1311
Frozen foods
dough-frozen production 1282
Fructose
dispersions, temp./aging & rheological changes during gelation of fructose 1379
Fruit juices
serum viscosity/pulp content & drying of fruit juices 1359
sugar content analysis ultrasonic of fruit juices 1358
Fruits
Indian fruit processing industries 1260
development of fruit processing industries 1261
emerging trends in fruit processing industries 1262
glutamic acid in Philippine fruits 1267
nisin & shelf-life of fruits 1223
processing industries, Himachal Pradesh 1264
processing industries, growth of fruit 1265 1266
processing units-Rajasthan 1263
Frying
oil uptake, frying deep-fat & criterion for 1371
tortilla chips, microstructure electron microscopic evaluation during deep-fat frying 1245
Galactosidases
misti dahi thermization & β-D-galactosidase activity 1296
Gas chromatography
citrus/grape juices, flavanones GC-MS characterization in 1360
Gels
egg white gels, failure deformation/stress relaxation of heated 1332
temp. mapping magnetic resonance imaging in food gel 1210
whey protein gels, emulsified butterfat & properties of acidic 1300
Genotoxicity
sorbates, genotoxicity of 1398
vitamin B, antigenotoxic effects of 1388
Ghee
sensory qualities of curdled milk ghee 1297
Globulins
sesame seed, alkaline sol. & β-globulin stability in 1235
Glucose oxidase
shrimp, glucose oxidase sol. & microbial spoilage control in 1335
Glucosidases
soybeans, β-glucosidase from 1236
Glutamic acid
fruit/vegetables, glutamic acid in 1267
Gluten
wheat gluten film, water/glycerol & mechanical/water vapour barrier properties of edible 1227
wheat gluten films, temp. & O_2 permeability of edible 1352
Grape juices
ellagic acid precipitation in stored Muscadine grape juices 1362
flavanones GC-MS characterization in grape juices 1360
Green beans
Phaseolus vulgaris cvs, texture preference & sensory evaluation of 1232
Groundnuts
coffee whitener, sensory evaluation/optimization of peanut milk-based liquid 1357
Guava
nectar, production of clear guava 1271
Hakes
roe, cooking & lipids in hake 1342
Ham
nitroso compounds mutagenicity in chilean ham 1321
Handling
wheat, handling of 1283
Heat
potatoes, dry heat & carbamate residue reduction in 1250
Heat exchangers
dairies, heat exchangers for 1211
Heating
beef lion steaks, heating & texture of packaged pasteurized 1307
citrinin, toxic compounds formation during heating of 1396
Hickory
pyloric glands development in rats, hickory-smoke condensate effect on pepsinogen 1-altered 1392
Hydration
soy protein isolate, hydration of heat-treated 1243
Hydrolysis
cassava flour, hydrolysis-enzymatic of 1248
mackerel mince lipid hydrolysis 1343
Ice creams
amino acids of commercial vanilla ice creams 1298
Industries
food processing industries, growth of 1197 1198 1199 1200 1201 1202
fruit/vegetable processing industries 1260
fruit/vegetable processing

industries, emerging trends in 1262
Infant foods
bioprocesses & protective factors amelioration in infant formulas 1351
Irradiation
bacon, nonane in irradiated 1319
chicken bones, free radicals yield in irradiated 1327
egg powder, cholesterol oxides in irradiated spray-dried 1331
identification of irradiated foods 1203
strawberries, γ-radiation & cell wall comp. of 1278
Isopropyl N-(3-chlorophenyl) carbamates
potatoes, moist/dry heat & carbamate residue reduction in 1250
Kefir
shelf-life improvement/safety of kefir 1291
Keropok
see Cracker
Khoa
flexible packages OTR during storage of khoa 1299
Kumiss
shelf-life improvement/safety of kumiss 1291
Kurthia
metmyoglobin conversion to myoglobin by Kurthia 1216
LDPE
aroma compounds absorption into LDPE 1208
Lactobacillus fermentum
metmyoglobin conversion to myoglobin by Lact. fermentum 1216
Lactones
milk, glucono-δ-lactone & acidification of 1289
Lassi
shelf-life improvement/safety of lassi 1291
Leben
shelf-life improvement/safety of leben 1291
Lecithin
bakery products, lecithin in 1282
Legumes
protein meals, processing & oligosaccharides of legume 1233
Lemon juices
N-nitrosomorpholine formation by lemon juices 1365
Limonoid
citrus juices, limonoids in 1353
Lipids
aldehydes, loss of volatile lipid 1372
autoxidation, temp. & tocopherol/ferulic acid inhibition of lipid 1370
catfish muscle microsomes, antioxidants/activators/ /inhibitors & lipid peroxidation 1339
catfish muscles, lipid extraction solvent systems from 1341
hake roe, cooking & lipids in 1342
mackerel mince lipid hydrolysis, characteristics of 1343
meat/fish, lipid hydroperoxides fluorometric peroxygenase assay in 1304
salmon, lipid composition of sockeye 1344
white amur, diets & lipids of 1347
Listeria monocytogenes
Carnobacterium piscicola & control of L. monocytogenes 1219
fat/emulsifiers & nisin inhibition of L. monocytogenes 1288
temp. Carnobacterium piscicola activity against L. monocytogenes 1218
Mackerels
characteristics of mackerel mince lipid hydrolysis 1343
Mandarin
kinnow-Citrus reticulata RTS beverages, thermal process for 1363
Mandarin juices
shelf-life of processed Kinnow juices 1364
Mangoes
industry, mango processing in 1273
ripening in wax-coated Bocado mangoes 1274
technology for mango processing 1272
vitamin A & mango consumption 1387
Marketing
broccoli, packaging modified atm. & marketing quality of 1256
Mass spectroscopy
citrus/grape juices, flavanones GC-MS characterization in 1360
Maturity
apple juices, maturity & chemical/sensory properties of 1361
peaches, maturity & sensory analysis of CV cresthaven 1276
Meat
cured meat, rubber nettings & N-nitrosodibutylamine/ /nitrosamines in packed 1303
frankfurters, meat source & production of low-fat 1322
lipid hydroperoxides fluorometric peroxygenase assay in meat 1304
nisin & shelf-life of meat 1223
trace metals in Sri Lankan animal foods 1389
Meat products
plasticizers migration into ground meat products 1320
Mechanical properties
wheat gluten film, water/glycerol & mechanical properties of edible 1227
whey protein films, mechanical properties/water vapour transferability through 1301
Metals
foods, trace metals in Sri Lankan animal 1389
Metmyoglobin
bacteria, metmyoglobin conversion to myoglobin by 1216
Microorganisms
shrimp, glucose oxidase sol. & microbial spoilage control in 1335
Microstructure
tortilla chips, microstructure electron microscopic evaluation during deep-fat frying of 1245
whipped cream, staining method & microstructure of 1294
Microwaves
baking, microwave technology in 1282
Milk
Ca/phosphate/chloride spectrophotometric detn. in milk 1286
free-choice profiling of milk 1287
glucono-δ-lactone & acidification of milk 1289
nisin & shelf-life of milk 1223
sensory analysis terminology for fluid milk 1285
Milk products
fermented milk products, shelf-life improvement/safety of 1291
nisin & shelf-life of milk products 1223
Milk protein
yoghurt, manufacture of high milk protein powder based non-fat 1302

Milling
by-products of flour milling industry 1283
developments in milling technology, book 1283
rice, milling characteristics of parboiled/milled 1224
wheat disease & milling quality 1283
Misti dahi
see Dahi
Moisture
low-moisture solids, pH of 1214
potatoes, moist heat & carbamate residue reduction in 1250
Mung beans
processing & nutritional value of mung beans 1230
Mushroom
1221
storage controlled atm. of mushroom 1222
toxins in mushrooms 1399
Mutagenicity
ham/sausages, nitroso compounds mutagenicity in chilean 1321
Myoglobin
bacteria, metmyoglobin conversion to myoglobin by 1216
Nectarines
storage controlled atm. & physiological disorders in nectarines 1275
Nisin
Listeria monocytogenes, fat/emulsifiers & nisin inhibition of 1288
foods, nisin & shelf-life of, review 1223
Nitrosamines
meat, rubber nettings & nitrosamines in packed cured 1303
Nitrosodibutylamines
meat, rubber nettings & N-nitrosodibutylamines in packed cured 1303
Nitrosodimethyl amines
frankfurters, N-nitrosodimethylamine formation in fish-meat 1323
Nitrosoguanidine
cultured milk antimutagenicity against N-methyl-N'-nitro-N--nitrosoguanidine 1290
Nitrosomorpholine
lemon juices, N-nitrosomorpholine formation by 1365
Nonane
bacon, nonane in irradiated 1319
Nucleotides
retinol deficient albino rats, 5'-nucleotidase activity in 1384
Nutmeg
aflatoxin contamination analysis TLC spots interference in nutmeg 1234
Nutrients
/sup 13/C labelled substrates, nutrient bioavailability assay using 1394
food processing, nutrients during 1390
Nutrition
proceedings of Nutrition Society of India 1387
Nutritional values
legumes, processing & nutritional values of 1230
palm oils, nutritional value of 1387
Oils
frying deep-fat & criterion for oil uptake 1371
Oilseeds
protein meals, processing & oligosaccharides of oilseed 1233
Oligosaccharides
oilseed protein meals, processing & oligosaccharides of 1233
Olives
pH & oxidation process for olives 1376
Osmosis
beef muscle, osmotic pressure DSC of 1314
Fick's second law & osmotic dehydration 1205
foods, osmotic dehydration kinetics of 1204
Oxidation
lipid autoxidation, temp. & tocopherol/ferulic acid inhibition of 1370
olives, pH & oxidation process for 1376
soybean oils, tocopherol & oxidative stability of 1373
Packaging
carambola, packaging & shelf-life of 1270
pork retail cuts, centralized bulk prepackaging of 1317
trends in Indian food packaging 1206
Packaging materials
khoa, flexible package OTR during storage of 1299
Packaging modified atmosphere
broccoli, packaging modified atm. & quality of 1256
Pagrus auratus
see Snapper
Palm
hearts, evaluation of palm 1378
Palm oils
nutritional effects of palm oils 1387
Parboiling
rice, milling characteristics of parboiled 1224
Peaches
maturity/ripening/storage & sensory analysis of CV cresthaven peaches 1276
Pectins
temp./aging & rheological changes during gelation of high-methoxyl pectin 1379
Pepper
oil, alcohol deterpenation of black pepper 1377
Peptides
fish sauces, peptides concn. & flavour of 1350
Peroxidases
yam tubers, storage & peroxidase activities of 1253
Peroxygenase
meat/fish, lipid hydroperoxides fluorometric peroxygenase assay in 1304
Pests
wheat, protein quality of insect infested 1228
Phenols
wines, ethylphenols in 1355
yam tubers, storage & phenolic content of 1253
Phosphates
milk, phosphates spectrophotometric detn. in 1286
Phospholipids
bakery products, phospholipids in 1282
Physical properties
fish, protease inhibitors & physical properties of 1336
Pickles
quality standards of Indian commercial pickles 1375
Pigeon peas
processing & nutritional value of pigeon peas 1230
Plastics
retortable plastic packaging for thermo-processed foods 1209
Plums
enzymatic clarification of plum pulps 1277

Polarography
beer, ethanol differential-pulse polarographic microdetn. & analysis of 1354
Pollock
surimi, protease inhibitors & physical properties of Wallyee pollock 1336
Polyethylene
acetic acid & detn. of polyethylene layers 1207
Pork
cuts, centralized bulk pre-packaging of pork retail 1317
roast, surimi-like pork products in restructured precooked pork 1316
roasts, temp. & pink coloration pigments in pork 1315
Potato starch
soy blends-potato starch 1239
Potatoes
moisture/dry heat & carbamate residue reduction in potatoes 1250
slices, process variables & drying of potato slices 1249
temp. & salt diffusion in potato 1252
thermal processing & softening of potatoes 1251
Poultry
biotechnology & poultry processing 1324
Processing
food processing industries, growth of 1197 1198 1199 1200 1201 1202
food processing, nutrients during 1390
frankfurters, processing method & production of low-fat 1322
fruit/vegetable processing industries in Himachal Pradesh 1264
fruit/vegetable processing industries, emerging trends in 1262
fruit/vegetable processing industries, growth of 1265 1266
fruit/vegetable processing industries-Indian 1260
fruit/vegetable processing units in Rajasthan 1263
mango processing in industry 1273
seafood processing plants, effluent water treatment economic/efficient method for 1333
spent hens, processing of 1325
Proteases
fish, protease inhibitors & physical properties of 1336
Protein foods
blends, high protein texturized products of defatted soy flour/corn starch/beef 1309
Proteins
dietary protein & cholesterol metabolism in small intestines 1386
food proteins, monoclonal antibodies & analysis of 1393
fortified foods, protein-binding assay for vitamin B_{12} in 1395
Proteins animal
egg proteins, gel point of 1330
myofibrillar protein-polysaccharide composite gels, viscoelastic properties of 1326
Proteins cereal
wheat, protein quality of insect infested 1228
Proteins milk
whey protein gels, emulsified butterfat & properties of acidic 1300
whey proteins, gel point of 1330
Puffing
bananas, explosion puffing of 1269
Pulps
fruit juices, pulp content & vacuum belt drying of 1359
plum pulps, enzymatic clarification of 1277
Pumpkin
Telfaria occidentalis fruit, pod/pulp of fluted 1258
Pungency
radish kimchi, fermentation & pungency in 1374
Quality
broccoli, packaging modified atm. & quality of 1256
pickles, quality standards of Indian commercial 1375
rabbit meat, tropical coastal condition & quality of 1318
sugarcane juices, location/variety & quality of 1280
Rabbits
meat, tropical coastal condition & quality of rabbit 1318
Radish
kimchi, fermentation & pungency in radish 1374
Ragi
response/lipemic index of ragi diet 1385
Raspberry juice concentrates
anthocyanin content of stored red raspberry juice concentrates 1366
Ready-to-eat foods
sag, retort processing & chemical composition/organoleptic quality of ready-to-eat 1254
Ready-to-serve beverages
kinnow-citrus reticulata RTS beverages, thermal process for 1363
Reference materials
preparation of food reference materials 1215
Refrigeration
Listeria monocytogenes, refrigeration temp. & Carnobacterium piscicola activity against 1218
carambola, refrigeration & shelf-life of 1270
Residues
potatoes, moist/dry heat & carbamate residue reduction in 1250
Restructured foods
pork roast, surimi-like pork products in restructured precooked 1316
Retinol
nucleotidase activity in retinol deficient albino rats 1384
Retort processing
sag, retort processing & chemical comp./organoleptic quality of ready-to-eat 1254
Rheological properties
cheese, whey protein concentrates & rheological properties of stored 1293
pectin/fructose dispersions, temp./aging & rheological changes during gelation of high methyoxyl 1379
Rice
cake, waxy maize starch adulteration detection in waxy rice 1225
glycemic response/lipemic index of rice diet 1385
parboiled milled rice, milling characteristics of 1224
Ripening
Cheddar cheese, biotechnology & accelerated ripening of 1292
apple juices, fruit ripening & chemical/sensory properties of 1361

bananas, temp. & ripening behaviour of 'Senorita' 1268
mangoes, ripening in wax-coated Bocado 1274
peaches, ripening & sensory analysis of CV cresthaven 1276
Roasts
pork roasts, surimi-like pork products in restructured precooked 1316
Rye flour
baking technology & rye flour 1282
baking technology & wheat flour 1282
Safety
milk products, safety of fermented 1291
Sag
ready-to-eat sag, retort processing & chemical comp./organoleptic quality of 1254
Salmon
lipid composition of sockeye salmon 1344
Salt
potato, temp. & salt diffusion in 1252
Saponins
soy saponins, Aspergillus niger effect on 1237
Sausages
nitroso compounds mutagenicity chilean sausages 1321
Seafoods
processing plants, effluent water treatment economic/efficient method for seafood 1333
Sensory evaluation
coffee whitener, sensory evaluation of peanut milk-based liquid 1357
crabcake from blue crab by-products, sensory evaluation of minced meat 1334
green beans, texture preference & sensory evaluation of 1232
milk, sensory analysis terminology for fluid 1285
palm hearts, sensory evaluation of 1378
performance assessment of sensory panelists 1381
snapper, sensory evaluation of Australian 1346
statistics & problem of sensory measurement 1380
Sensory properties
apple juices, maturity/fruit ripening & sensory properties of 1361
beef blends, high-protein texturized products of defatted soy flour/corn starch 1309
beef patties, fat level/freezing temp. & sensory properties of 1311
cheese, whey protein concentrates & sensory properties of stored 1293
ghee, sensory qualities of curdled milk 1297
white amur, diets & sensory properties of 1347
Sensory quality
sag, retort processing & organoleptic quality of ready-to-eat 1254
Sesame
alkaline sol. & β-globulin stability in sesame seed 1235
Shelf-life
beef blends, shelf-life of defatted soy flour/corn starch 1309
carambola, packaging/refrigeration & shelf-life of 1270
foods, nisin & shelf-life of, review 1223
mandarin juices, shelf-life of processed 1364
milk products, shelf-life improvement/safety of fermented 1291
misti dahi thermization & shelf-life 1296
Shrikhand
shelf-life improvement/safety of shrikhand 1291
Shrimps
glucose oxidase/catalase sol. & microbial spoilage control in shrimp 1335
Smooth oreodory
see Fish 1345
Snacks
fish cracker manufacture, tapioca starch for 1348
Snapper
Pagrusauratus, sensory evaluation of Australian 1346
Sodium dodecylsulphate
soybeans, SDS & 7S fraction of 1242
Softening
potatoes, thermal processing & softening of 1251
Solvent
catfish muscles, lipid extraction solvent systems from 1341
Sorbates
genotoxicity of sorbates 1398
Soy flour
bitter compounds in soy flour 1353
blends, extrusion of defatted soy flour/corn starch/beef 1308
blends, high-protein texturized products of defatted soy flour/corn starch/beef 1309
Soy milk
bifidobacterium ssp. & bacterial growth/volatile compounds in soy milk based yoghurt-type products 1241
storage of stabilized soy milk 1240
Soy products
extrudates, extruder-twin screw & texture evaluation of dehulled whole soybean 1238
potato starch soy blends 1239
Soy proteins
hydration of heat-treated soy protein isolate 1243
sodium dodecylsulphate & 7S fraction of soybeans 1242
soybeans & comp./structural characteristics of isolated soy proteins 1244
Soybean oils
stationary phases for GLC, soybean oils as 1369
tocopherol & oxidative stability of soybean oils 1373
Soybeans
β-glucosidase from soybeans 1236
saponins, Aspergillus niger effect on soy 1237
Spectrophotometry
milk, Ca/phosphate/chloride spectrophotometric detn. in 1286
wine distillates, biacetyl spectrophotometric detn. in 1356
Spoilage
carrots, yeast spoilage in ready-to-use 1247
shrimp, glucose oxidase/catalase sol. & microbial spoilage control in 1335
Stability
soybean oils, tocopherol & oxidative stability of 1373
Stabilization
soy milk, storage of stabilized 1240
Standards
pickles, quality standards of Indian commercial 1375

Steers
tocopherol acetate-dietary & quality of beef 1310
Sterilization
Bacillus stearothermophilus, sterilization temp. & spores of 1217
Storage
broiler chicken meats, storage & chemical properties of fatty acid enriched 1329
cheese, whey protein concentrates & sensory/rheological properties of stored 1293
khoa, flexible package OTR during storage of 1299
soy milk, storage of stabilized 1240
Storage cereals
wheat, storage of 1283
Storage cold
fish minces, foaming capacity of frozen stored 1349
Storage controlled atmosphere
mushroom, storage controlled atm. of 1222
nectarines, storage controlled atm. & physiological disorders in 1275
Storage fish
smooth oreodory, cold storage & spoilage of 1345
Storage fruits
grape juices, ellagic acid precipitation in stored 1362
peaches, storage & sensory analysis of CV cresthaven 1276
raspberry juice concentrates, anthocyanin content of stored red 1366
Storage vegetables
yam tubers, storage & composition of 1253
Strawberries
γ-radiation & cell wall comp. of strawberries 1278
Sugar
effluents, BOD equation constants for sugar mill 1279
fruit juices, sugar content analysis ultrasonic of 1358
sugarcane, sugar recovery estimation formula for 1281
Sugarcane juices
location/variety & comp./quality of sugarcane juices 1280
Surimi
frankfurters, N-nitrosodimethylamine formation in fish-surimi 1323
Tapioca
glycemic response/lipemic index of tapioca diet 1385
Tapioca starch
fish cracker manufacture, tapioca starch for 1348
Tea
epicatechin/fatty acid composition of Sikkim tea 1367
Technology
mango processing, technology for 1272
Telfaria occidentalis
see Pumpkin
Terminology
milk, sensory analysis terminology for fluid 1285
Texture
beef lion steaks, heating & texture of 1307
green beans cvs, texture preference & sensory evaluation of 1232
soy extrudates, extruder-twin screw & texture evaluation of dehulled whole 1238
Thermal process
kinnow-Citrus reticulata RTS beverages, thermal process for 1363
Thermal processing
potatoes, thermal processing & softening of 1251
Thermization
misti dahi thermization & acid producers count 1295
misti dahi thermization & shelf-life/β-D--galactosidase activity 1296
Thermo-processed foods
retortable plastic packaging for thermo-processed foods 1209
Tocopherol acetate
beef, tocopherol acetate & quality of 1310
Tocopherols
lipid autoxidation, temp. & tocopherol inhibition of 1370
soybean oils, tocopherol & oxidative stability of 1373
Tomatoes
pulp, ultrafiltration & preparation of tomato 1259
Tortilla
chips, microstructure electron microscopic evaluation during deep-fat frying of tortilla 1245
Toxins
citrinin, toxic compounds formation during heating of 1396
fatty acids & hepatic activation of dietary genotoxins 1391
foods, toxic plant constituents in 1399
Traditional foods
wheat based traditional foods 1283
Trogoderma granarium
azadirachtin & vitellogenic oocyte development in Tr. granarium 1382
Ultrafiltration
tomato pulp, ultrafiltration & preparation of 1259
Ultrasonics
fruit juices, sugar content analysis ultrasonic of 1358
Vegetables
Indian vegetable processing industries 1260
development of vegetable processing industries 1261
emerging trends in vegetable processing industries 1262
glutamic acid in Philippine vegetables 1267
processing industries, Himachal Pradesh 1264
processing industries, growth of vegetable 1265 1266
processing units-Rajasthan 1263
production of vegetables 1255
Viscosity
fruit juices, serum viscosity & drying of 1359
myofibrillar protein-polysaccharide composite gels, viscoelastic properties of 1326
Vitamin A
mango consumption & vitamin A 1387
Vitamin B
antigenotoxic effects of B-vitamins 1388
Vitamin B_{12}
fortified foods, protein-binding assay for vitamin B_{12} in 1395
Volatile compounds
yoghurt-type products, bifidobacterium ssp. & bacterial growth/volatile compounds in soy milk based 1241
Washing
beef carcass tissue, washing & bacterial penetration into post-rigor 1313
Waste water
sugar mill effluents, BOD equation constants for 1279

Wastes
fish waste utilization in Indonesia 1337
seafood processing plants, effluent water treatment economic/efficient method for 1333
Water
wheat gluten film, water & mechanical/water vapour barrier properties of 1227
Wax
mangoes, ripening in wax-coated Bocado 1274
Wheat
baking technology & wheat 1282
conditioning of wheat 1226
gluten film, water/glycerol & mechanical/water vapour barrier properties of edible wheat 1227
gluten films, temp. & O_2 permeability of edible wheat 1352
protein quality of insect infested wheat 1228
storage/handling of wheat 1283
Wheat flour
baking technology & wheat flour 1282
extruder-twin screw & extrusion cooking of wheat flour 1229
Wheat products
preservatives & shelf-life of wheat based products 1283
Whey proteins
films, mechanical properties/water vapour transferability/through whey protein 1301
Wheys
gels, emulsified butterfat & properties of acidic whey protein 1300
proteins, gel point of whey 1330
White amur
Ctenopharyngodon idella, diets & fatty acids/lipids/sensory properties of 1347
Wines
bitterness in wines 1353
ethylphenols in wines 1355
distillates, biacetyl spectrophotometric detn. in wine 1356
Yam
storage & composition of yam tubers 1253
Yeasts
carrots, yeast spoilage in ready-to-use 1247
Yoghurts
manufacture of high milk protein powder based non-fat yoghurt 1302
shelf-life improvement/safety of yoghurts 1291

NATIONAL INFORMATION CENTRE FOR FOOD SCIENCE AND TECHNOLOGY
CFTRI, MYSORE - 570 013

Also subscribe to our other periodicals

1. **FOOD DIGEST** (Quarterly)
This is oriented towards the information needs of food industries, trade and marketing personnel, entrepreneurs, decision makers and individuals engaged in food field.
Annl Subn: Indian Rs. 150/- Foreign $. 65/-

2. **FOOD PATENTS** (Quarterly)
Gives world patent information on Food Science and Technology taken from national and international sources.
Annl Subn: Indian Rs. 100/- Foreign $. 50/-

For details, please write to:
The Head
FOSTIS, CFTRI
Mysore - 570 013, India

COMPUTERISED DATABASE SEARCH OF WORLD FOOD LITERATURE

The National Information Centre for Food Science and Technology (NICFOS) at CFTRI, Mysore, has developed facilities for computerised "Database Search" of the world literature in Food Science and Technology and related disciplines. Retrospective search-service facility extending upto about 20 years is available on nominal payment basis. Titles alone or with abstracts can be requisitioned as per the needs of the intending users.

For details, please write to:
The Head
FOSTIS, CFTRI
Mysore - 570 013, India

Regd. No. 36729/84

Printed and published by Director, Central Food Technological Research Institute, Mysore -570 013, at CFTRI Printing Press. Editor: Shri K. A. Ranganath, CFTRI, Mysore.